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Trade Networks and Artifact Analysis: A Comparison of Elite Households 1780-1810

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TRADE NETWORKS AND ARTIFACT ANALYSIS:
A COMPARISON OF ELITE HOUSEHOLDS 1780 - 1810

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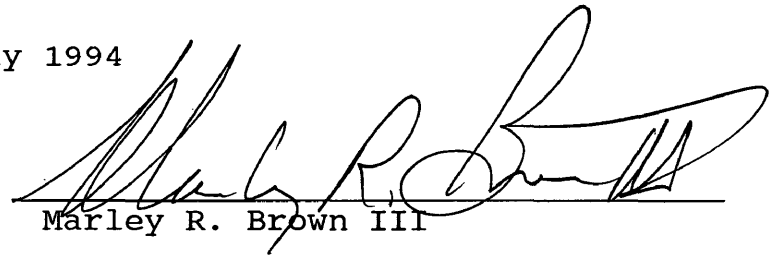
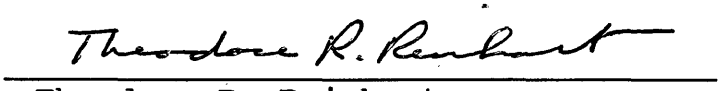


Marley R. Brown III



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ABSTRACT

The quantification of material is a major tool in archaeological analysis. There are a number of standard methods available to archaeologists, plus a steady influx of new approaches. This study evaluates potential alternative applications of three established quantitative methods, plus a relatively new method of analysis.

South's (1977) Pattern Recognition, Miller's (1980) Status Indexing, and Zierden and Grimes's (1989) Status Measures are used to explore the measurement of a location's position in the international trade network. Diversity measures are also employed to this end.

Sites from St. George's, Bermuda and Williamsburg, Virginia are used to test the hypothesis: if sites of the same socioeconomic status from distinct geographic locations occupy different positions in the international trade hierarchy, the positions held will be reflected in the material goods found in the locales. The assemblages cover the period from the late eighteenth to early nineteenth centuries.

TRADE NETWORKS AND ARTIFACT ANALYSIS:

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INTRODUCTION

This thesis has two main objectives: to test a hypothesis, and to evaluate the serviceability of a number of tools in the archaeologist's analytical tool kit. The hypothesis is based on a hierarchical trade network model and goes as follows: if sites of the same socioeconomic status, from distinct geographic locations, occupy different positions in the international trade hierarchy, the positions held will be reflected in the material goods found in the locales. This idea will be tested from three different perspectives using four different methods of analysis. Three of the applications will be alternative uses of standard archaeological tools and the fourth tool is relatively new to historical archaeology.

Stanley South's (1977) pattern recognition will be used to evaluate a location's degree of connection to the economic market. George Miller's (1980, 1991) status indexing and Martha Zierden and Kimberly Grimes's (1989) status measures will be used test the quality of goods available in a location. Diversity measures, the fourth tool, will also be used to quantify quality of goods available. In addition, they will be used to address the range of trade connections enjoyed by a location.

Three sites from two locations will be used to test the

hypothesis and the four methods of analysis. St. George's, Bermuda, is represented by the Tucker House site and Williamsburg, Virginia, is represented by the Barraud and the Peyton Randolph sites. The temporal range involved is from 1780 to 1810. Ceramics will be quanitified in all four types of analysis. Glass and some other artifact types are included in the South, Zierden and Grimes, and diversity measure calculations. All three assemblages represent high status in their respective locations.

It is clear that both St. George's and Williamsburg occupy different niches in the international trade network, meaning that they have individual relationships with their trading partners. However, there is some discrepancy as to the positions held by the two places within the international trade hierarchy. Jack Greene (1988) and Donald Meinig (1986) have both examined the social history of Bermuda. They have based their opinions on essentially the same data but have different views on the Bermudian situation. Greene has a negative perspective, choosing to focus on Bermuda's limitations, and he presents a bleak view of her economic situation. Meinig looks positively on the Bermuda scene and concludes that, because of the handicaps of island life, Bermudians were forced to develop their international economic connections. Based on this discrepancy, St. George's, Bermuda occupied either a lower position or at least an equal position in the international trade hierarchy to that of Williamsburg,

Virginia. Either way, the testing of the hypothesis will reveal something of the relationship had by St. George's and Williamsburg in the international trade hierarchy.

Chapter One sets the scene for this study. It covers the research done using trade network models in historical archaeology and develops the hypothesis and the plan to test it. It includes a discussion of inter-site comparison and the usefulness of household assemblages. It concludes with a section outlining the four tools to be used to test the hypothesis and a discussion of the suitability of glass and ceramics in this kind of research.

Chapter Two will set the historical scene. The economic setting of the late eighteenth to early nineteenth centuries will be described from the international level on down to the local level in St. George's and Williamsburg. Towards this end primary and secondary sources will be consulted. The outcome will be a rough placing of St. George's and Williamsburg in the international trade hierarchy.

Chapter Three presents three standard tools in archaeological analysis: South's pattern recognition, Miller's status indexing, and Zierden and Grimes's status measures. Each tool is described, and the alternate use to be employed in testing the hypothesis is explained. The application and interpretation of the three tools to the Tucker, Barraud and Peyton Randolph assemblages follow their respective discussion sections. The chapter evaluates the success of the

alternative applications of the three standard tools and presents the conclusion that the glass and ceramic goods available to consumers in St. George's, Bermuda and Williamsburg, Virginia were similar.

Chapter Four is an introduction to diversity measures. The three components of diversity (richness, evenness and heterogeneity) will be described. The means of measuring diversity will be explained, including the choice of formulae and the development of the classification scheme. A review of applications of diversity measures in historical archaeology will ensue, followed by the outline of the application of the diversity concepts to be used to test the hypothesis.

Chapter Five is the application and interpretation of the diversity measures used to test the hypothesis. Measured are the richness and evenness of the point of origin and the quality of the ceramic and glass assemblages from the three sites. This application indicates that the diversity measures are a good analytical tool in historical archaeology. The results of this quantification supported the conclusions drawn in Chapter Three, that St. George's, Bermuda and Williamsburg, Virginia had a similar access to glass and ceramic goods.

Chapter Six presents the concluding remarks. The testing of the hypothesis suggests a number of things. First, although St. George's, Bermuda and Williamsburg, Virginia, had individual relationships with their trading partners and exploited different niches in the international trade network,

their actual positions in the international trade hierarchy may not have been that different. Alternatively, it may be that they did occupy significantly different positions in the hierarchy, but that glass and ceramics are poor indicators of it. It may also be possible that the hypothesis is not true at all and that position in a trade hierarchy has no relationship with the goods available in a location.

CHAPTER 1

TRADE NETWORKS AND THE GLOBAL PERSPECTIVE

INTRODUCTION

This chapter is divided into three sections. The purposes are to introduce the study of trade networks and develop the hypothesis to be tested, to evaluate the usefulness of inter-site comparison, and outline the analytical tools to be used in the study. The first section is dominated by a review of the literature dealing with the study of trade networks in historical archaeology. This section concludes with the statement of the hypothesis: if sites of the same socioeconomic status from distinct geographic locations occupy different positions in the international trade hierarchy, the positions held will be reflected in the material goods found in the locales. The second section is a discussion of inter-site comparison and the usefulness of household assemblages in such a comparison. The final section discusses the nature of the Bermuda/Virginia comparison. The four different methods of analysis to be employed will be discussed: South's pattern recognition, Miller's status indexing, Zierden and Grimes's status measures, and the measure of diversity.

TRADE NETWORKS

Tracing the flow of goods and ideas has been a major area of study in prehistoric archaeology for decades. Since the 1970s archaeologists have applied trade models to historical assemblages. This section outlines the development of trade network studies in historical archaeology. Research has focused on topics such as economic hierarchies, variables, and urban and rural levels of analysis. The section concludes with the development of the trade network based hypothesis to be tested in this thesis.

Deetz and Dethlefson's (1967) study of grave markers deals with the diffusion of stylistic images in time and space. The complexity of the spread of ideas as revealed by the authors applies to the trade of goods. A number of factors can influence the spread of an idea. In the case of grave markers social class and religious values affected the diffusion of styles. The study showed that in the exchange of goods through there are many contributing factors and that there is more to the issue of trade than a simple model of a dissipating flow of goods from a centre of production.

The complexity of economic systems in historical archaeology was recognized by Klein who explored the concepts of economic stress, equilibrium, hierarchies and networks. Basing his ideas on a hierarchy of long-range, short-range and local levels, he proposed the following two-part hypothesis: "During periods of economic stress communities will increase

their involvement in short-range trading networks" and "During periods of economic stress communities will decrease their involvement in long-range and local trading networks (1973:76)." Klein did not test this hypothesis, but suggested that it could be tested using historical archaeological material. A number of subsequent authors have referred to Klein's work but no author who had tested was found during the literature search. Adams (1976:109) concluded that the usefulness of Klein's hypothesis was limited to the Northeast industrial region of the United States. Jones (1983:28), on the other hand, used Klein's untested hypothesis as a possible explanation for two deviations to his population and trade model. The full value of Klein's hypothesis will not be known until it is tested. At present the value of Klein's work is that it has brought to the fore some major concepts in economically oriented research in historical archaeology, namely networks, hierarchy and economic stress.

In combination, the work of Deetz, Dethlefson and Klein established the number of variables influencing the flow of goods and the idea of an economic hierarchy. Researchers like Adams (1976), Cleghorn (1981), Baugher-Perlin (1982), Garaventa and Pastron (1983), Jones (1983), Riordan and Adams (1985), Agnew (1988) and others have branched out from here in the investigation of trade networks and archaeological material.

Adams (1976) was the first to employ historical

archaeological material in the study of trade networks. He established the fundamental components in the flow of goods (networks and interaction spheres), presented a six-tiered hierarchical trade model, and promoted the use of archaeological material in the study of some of the levels of his trade model.

Adams also differentiated networks and interaction spheres although he maintained that they are virtually inseparable. The network is the "...hierarchy of central places towards which people are oriented for social, economic and political reasons" and it is the network that links centres together (Adams 1976:99). While networks are defined as a physical linking of actual places, the interaction sphere is defined as being "...similar to the network except that the individual linkages are in themselves not as important as the fact of their existence" (Adams 1976:99), i.e. the significance is in the fact that an item ended up somewhere, but how it got there is immaterial. Whether examined separately or in combination, networks and interaction spheres are the fundamental components for the study of the flow of goods.

Adams (1976:104) picked up where Klein (1973) left off by identifying six interrelated levels of trade: local, local-commercial, area-commercial, regional, national and international. In his discussion of these levels Adams (1976:108) concluded that archaeological data are best suited

for studies of regional and national trade networks and interaction spheres. He (1976:110) stated that "From an archaeological standpoint we can never really investigate the complex international networks because so much of the imported goods were raw materials". It is not entirely clear whether Adams was referring to the usefulness of all archaeological material or just to his study case of early twentieth-century bottles found in Silcott, Washington. If he was making a general statement my study challenges that conclusion. It is the opinion of this author that archaeological material such as glass and ceramics, can prove useful in the study of international trade networks on North American sites because of the fact that large quantities of those materials were imported from foreign sources.

An increase in trade-oriented studies occurred in the 1980s, but most have lacked the scope of Adams's research. Cleghorn's study of a community store in Maunaloa, Hawaii, had a local focus even though he concluded that "Maunaloa is connected to most of the economic world through a complex set of trade and distribution networks" (1981:210). Cleghorn made some observations about the nature of the connection: it was one-way, and goods were imported with nothing exported from Maunaloa. He also noted that a number of goods, imported from western Europe, were a curious occurrence because the same goods were manufactured closer to the islands of Hawaii. The view Cleghorn took was one from the local level looking out to

the international level of trade networks. Unfortunately, it was beyond the scope of Cleghorn's research to evaluate Maunaloa's position in the international trade network hierarchy.

One can also study trade networks with an external view. Baugher-Perlin (1982) did an urban/rural inter-site comparison while Garaventa and Pastron (1983) studied one site stressing its pivotal role in the network.

Baugher-Perlin evaluated the usefulness of bottles in the study of trade networks. Like Adams, Baugher-Perlin favoured tracing the origin of goods using the embossed marks on glass bottles. Although her study was a cursory example of the effectiveness of this kind of analysis, Baugher-Perlin recognized that different sites may reflect differential access to goods. She stated "...we must remember that there were differences in purchasing patterns between rural and urban communities and between regional areas" (1982:287). Baugher-Perlin concluded that bottles, especially in combination with other archaeological data, were an effective tool of analysis and that "Intersite comparisons should be made to assist us in moving beyond the local setting to regional, national, and even international levels" (1982:288).

Like Baugher-Perlin, Garaventa and Pastron recognized the significance of the position of a site in a trade network. These authors examined Chinese ceramics from a dump site in San Francisco and came to the conclusion that "The diversity

of the sample is linked to the unique position of San Francisco as the urban focal point of the Chinese community in California" (1983:295), i.e. San Francisco was home to the largest Chinese community in the area. Garaventa and Pastron went on to say that "Individual sites are related to others in that they are part of an interaction sphere or network in which a flow of workers and goods were transported and used" (1983:311). Conclusions like those of Baugher-Perlin and Garaventa and Pastron are important because they promote intersite comparison and the study of international processes.

The issue of variables is readdressed with a study by Jones in 1983. He dealt with the problem of changing population size and a population's ability to access different trade markets using a mathematical model. His idea was that as population increases, regional trade decreases and long-distance trade increases. As population decreases the opposite occurs. In this study Jones (1983:1) defined the different markets by the distances goods travelled to the population in question. This may be a reasonable practice in his study of San Juan Island, Washington, but it may not prove useful for the study of a site close to a major point of access like New York. Jones (1983:7-8) identified four variables he aspired to control: consumer preference, transportation, consumer population size and the quantity of production of goods in each market, plus the variable of economic stress which he could not control. Basically,

Jones's model worked with his data and all but one of the deviations he encountered were explained. It is the opinion of this author that Jones's model will hold true in many locations, but it is not universal. An example is the study by Cleghorn (1981) where a small population in the Pacific Ocean had access to goods from western Europe. While one can accept the basic idea that population growth increases participation in higher levels of the trade network, Jones's model requires further adjustments in order to explain many situations. The model would likely benefit if the concept of commodity flow as presented by Riordan and Adams (1985) were incorporated into it.

In a 1985 study of national trade networks Riordan and Adams incorporated the concept of commodity flow. Commodity flow is defined as "The quantity of manufactured items and the direction of their shipment..." (Riordan and Adams 1985:6). In their study Riordan and Adams (1985:6) use a commodity flow model proposed by Allan Pred based on the identification of three industry groups (raw material and power oriented industries, market oriented industries and labour related industries) and market access. The United States was divided into three main areas based access to goods. Using archaeological data from the late nineteenth and early twentieth centuries the authors tested the following hypothesis:

> When located in different geographic regions, sites having the same access to the national market will show

> greater similarity to each other than to sites having different access, even when located in the same region (Riordan and Adams 1985:8).

The data analyzed by the authors showed the hypothesis to be essentially accurate. Their analysis is particularly relevant to my study because my hypothesis is similar. If Bermuda and Virginia have different access to goods in the international market, the material culture found in both places should reflect this by being dissimilar.

One of the earliest studies relating household material to international trade was Agnew's (1988) examination of an assemblage from Portsmouth, New Hampshire. Agnew began with an outline of the international and local trade scene for her area and time period. She then set out to evaluate how well the ceramic evidence from one household reflected the historical and economic developments of the period (1988:44). Agnew (1988:58) concluded that the ceramic artifacts did "...reflect the extent of the Portsmouth trade, both in the scope and frequency of certain artifacts". Although Agnew's 'model' is not specifically defined, she has located the position of her site within the international trade network to test her hypothesis that the artifacts would reflect this position. The aim of my study is the same although the tools used to analyze the archaeological material are different.

With the growing interest in Spanish colonial research, a number of trade-oriented studies have been undertaken recently. Williams (1992) examined the validity of a standard

capitalist world-system model using the ceramics material from three Spanish military sites in the New World. He found that contrary to the belief that these sites depended heavily on Spain, their European counterpart, they were initially self-sufficient. Joseph and Bryne (1992) found that different socioeconomic groups in Viejo San Juan, Puerto Rico, had unique ceramic consumption patterns that related to trading spheres. All groups participated in the three identified trading spheres (local Hispanic, non-local Hispanic, non-Hispanic) to varying degrees. Finally, Skowronek set out to study illicit trade in the New World in the sixteenth century where "...an examination of the ceramic evidence for illicit trade in the colonies of Hispaniola and Spanish Florida concludes that it was extremely limited in extent" (1992:109). These three studies demonstrate the variety of ways archaeological material can be used to challenge and evaluate notions about trade networks and the way they work on many different levels. In addition, the usefulness of ceramic material is supported in these studies where the origin of the wares was identifiable.

All the research discussed above has contributed to our understanding of the flow of goods. The work of Klein (1973) served to introduce the subject and established a number of the variables involved in its study. Adams's 1976 article was the first to report the use of historical archaeological material in the study of trade networks. Adams presented a

six-tiered, hierarchical trade model and established his fundamental components in study of the flow of goods, networks and interaction spheres. Since 1976 researchers have investigated a range of issues regarding trade networks. Studies have focused on the local level, urban/rural comparisons, and urban levels with an external focus (Cleghorn 1981, Baugher-Perlin 1982 and Garaventa and Pastron 1983). In 1983 Jones examined population and trade networks and documented additional variables involved in trade. The present study incorporates the hierarchical view of trade networks, is specific about the trade network levels being considered, and aims to address the variables.

The hypothesis of this thesis assumes the existence of a hierarchical trade network. Based on this assumption it is suggested that if sites of the same socioeconomic status from distinct geographic locations occupy different positions in the international trade hierarchy, the positions held will be reflected in the material goods found in the locales. This hypothesis is similar to that tested by Riordan and Adams (1985) who found that there was a greater similarity between sites with the same access to the national market in different geographic regions, than there was between sites with different access in the same region. It is different from that of Riordan and Adams in focus only. This research deals with the international market and aims to measure the differences in access to goods based on material culture. The

term access in this thesis refers to what was available from where in a community. The ability of the households to afford what was available will be held constant as all the sites will be of equivalent socioeconomic status.

The approach used by Agnew (1988) in her trade network study is followed here to test the hypothesis. The Spanish studies mentioned are examples of the use of ceramics in the study of trade and show how they can apply to research questions at an international level. Chapter Two deals with the international trade scene from 1780 to 1810 and evaluates the positions of St. George's, Bermuda and Williamsburg, Virginia in that framework. The hypothesis will be tested through an inter-site comparison of glass and ceramic material.

THE GLOBAL PERSPECTIVE AND INTER-SITE COMPARISON

The idea of using archaeological material to answer questions of global process is not new. James Deetz (1977:5) defined historical archaeology as "...the archaeology of the spread of European culture throughout the world since the fifteenth century and its impact on indigenous peoples." A word often overlooked in this definition is 'world'. Deetz (1991:2) has gone on to say that as historical archaeologists "...we must broaden our view to a global perspective, for the simple reason that we are dealing with a global phenomenon". Others support this view including Skowronek who's own

investigation of colonial trade relations "...illustrate the need to view research, especially on historical archaeological sites, in the proper holistic cosmopolitan and historical commercial setting" (1992:114). This study aims to follow Deetz's lead and add to the growing body of scholarly research (Falk 1991) dealing with global cultural processes. The question remaining is how best to go about achieving this goal.

Household assemblages will be used to test the hypothesis outlined in the previous section. Although an argument could be made against the use of household material, this author supports the conclusions of Agnew (1988) and expects profitable results. It takes no more than a glance at our present situation to realize that the material culture that surrounds us is a reflection of the modern international economy. Further to this, an examination of the goods available in today's urban and rural communities suggests that places participate in the global economy at different levels. What ends up in our homes is a direct result of materials to which we have access, so the study of the household assemblages provides a perfect opportunity to learn about the international trade network.

In this thesis the sites chosen are of similar status as the variable of socioeconomic status should be constant. The households reflect a high degree of affluence. High status groups should best exhibit the range of goods available in

their communities as they were able to afford what was available. Their pattern of consumption, however, could be skewed in other ways.

THE NATURE OF THE COMPARISON

The final section in this chapter deals with the way the archaeological assemblages will be compared. In testing the hypothesis the idea is to measure the assemblages in ways that are meaningful in terms of access to goods. Four methods of analysis will be employed.

Three existing analytical tools available for the quantification of archaeological material will used to address the hypothesis: South's (1977) pattern recognition, Miller's (1980) status indexing and Zierden and Grimes's (1989) status measures. The complete assemblages of the Bermudian and Virginian sites will be compared using South's method, the expectation being that the artifacts will reflect their degree of connection to the economic market. Both Miller and Zierden and Grimes offer methods of socioeconomic scaling using ceramics and ceramics and glass respectively. An alternative application of these tools will be tested here. The idea is that a comparison of households of similar socioeconomic status located in distinct economic spheres will result in an index reflecting the availability of goods.

The measure of diversity is the fourth and final method of comparison to be used. The concepts involved in the

measure of diversity are discussed in Chapter Four. The remainder of this section will explain the choice of glass and ceramics for the diversity comparison and the attributes of these materials to be measured.

Glass and ceramics were chosen because they survive well archaeologically, are relatively easily identified, and they represent objects that were exported by manufacturing countries in great quantities. Glass and ceramics make good archaeological indicators of the workings of trade-networks because they were so widely exported. Deagan has pointed out that functionally they are less problematic to analyze as generally speaking "...ceramic objects share the function of 'vessels' most often associated with foodways behaviour. Glassware items found on archaeological sites share the general functions of serving as containers or drinking vessels" (1987:185).

It must be decided what are the best aspects of the glass and ceramic to quantify which will reflect the availability of goods. In large urban centres today the consumer has the choice of a wide variety of goods from different parts of the world. In addition, there is a range of qualities available to the consumer. A consumer can choose to eat off Melmac dishes or a fine set of Rosenthal china. Although the variety of goods produced throughout the world today is much greater than what was around at the end of the eighteenth century, a similar situation existed on a smaller scale and should be

just as quantifiable. Thus, the quantification of the point of origin and the range of quality of the glass and ceramic assemblages from Bermuda and Virginia should reveal trade connections and access to goods respectively. Both of these perspectives address the hypothesis.

The four methods of analysis will be used to test the hypothesis. Each of the tools will address one or more of the following interrelated aspects of the hypothesis: the quality of goods available, the range of goods available, and the level of connection to the economic market enjoyed by a locale. The potential for alternative applications of some standard archaeological tools will also be explored.

CHAPTER 2

INTERNATIONAL TRADE AND THE FLOW OF GOODS: 1780 TO 1810

INTRODUCTION

To evaluate the positions of St. George's, Bermuda, and Williamsburg, Virginia, in the international trade network an understanding of the history of the period is necessary. This chapter provides an overview of the economic developments in the period from 1780 to 1810. The chapter is divided into five sections that address different trade network levels. The first section describes the international context. The second and third sections take a closer look at the situations of Bermuda and Virginia respectively. The fourth section discusses St. George's and Williamsburg and what glass and ceramic goods were available to consumers in the two towns. The final section presents the three deposits to be use in the quantification and discusses their suitability for comparison. The discussion is based on a variety of sources.

Secondary sources will be consulted to provide the general setting. Books and articles dealing with the international economy as well as those focusing on Bermuda and Virginia and the Chesapeake will be examined.

The fourth section in this chapter, which deals with the

glass and ceramics actually available in St. George's and Williamsburg, is based on primary sources where possible. Newspaper ads from the Bermuda Gazette will be used to demonstrate the goods available in Bermuda. The goods available to Williamsburg consumers will be determined using secondary sources, a few newspaper ads, and probate inventories from York County. The primary sources for Williamsburg are limited as the Williamsburg newspapers move to the new capital, Richmond, in 1781, and the records for James County were destroyed by fire in the Civil War.

What follows is a description of the international economy in the late eighteenth and early nineteenth centuries. The relative positions of Bermuda and Virginia will be set in this context and a description of the glass and ceramic goods available in both locations will be given. A brief history of the sites will ensue followed by a discussion of their suitability for comparison.

GENERAL SETTING: THE INTERNATIONAL ECONOMY 1780-1810

This section considers the impact of wars, the rise of the industrial revolution, the development of the shipping industry and the practice of privateering on international trade from 1780 to 1810. The focus of the discussion is on Britain and her colonies and the United States.

A close relationship exists between economic and political spheres. Ernest Fayle points out that shipping was

important for economic reasons, but

> There was an even stronger reason, however, for fostering the shipping industry. Not only did the ships earn freights which went to swell the 'favourable balance of trade'; the ships themselves were a part of the national strength (Fayle 1933:183).

Fayle (1933:184-85) continues that

> Whatever their ostensible cause, all the great European wars of the late seventeenth, and eighteenth centuries, tended to develop into a struggle among the Western Powers for colonies and spheres of influence, and during the brief intervals of peace, their commercial policy was inspired by the same motives that actuated them in war.

Michael Marshall (1990:94) supports this observing that

> From 1689 to 1815 Britain fought seven wars which occupied 56 of those 125 years: five wars were started, and the other two ended, with France. It would appear that a principle cause of these wars was the competing interests of the empire-building nations as they struggled to gain control of the seas, ocean trade, and each other's colonies.

Britain's participation in wars had, economically speaking, positive results as "By the end of the eighteenth century their empire of trade was the greatest in the world, with its defense resting upon control of strategic bases such as Gibraltar, Malta and Egypt, the Cape Colony, Aden at the entrance of the Red Sea, Ceylon, and India" (Condliffe 1950:79). Throughout the period from 1780 to 1810 Britain was a major trading force in the world. As a nation, the United States, was just being formed.

The early 1780s saw the conclusion of the American War of Independence (1775 - 1783) which had disrupted the flow of

British and American goods. In terms of trade potential Britain came out well from the American War of Independence. Although the separation from the American colonies meant that Britain lost the ability to syphon off their wealth, the new maritime nation remained as a profitable market (Marshall 1990:128). In fact, "...after the war Anglo-American trade continued, with Britain exporting manufactured goods, and exchanging slaves and gold from the Gold Coast in either the Caribbean or America for sugar, tobacco and timber" (Marshall 1990:96). Armstong (1969:47) agrees stating: "Contrary to all expectations the loss of the colonies resulted in an enormous increase in trade".

The British manufacturing economy was a result of the industrial revolution. Fayle notes a few factors that aided Britain's success including:

> ... the adoption of coal (hitherto used mainly for domestic purposes) as an industrial fuel; and the introduction of machinery in the textile trades. With these aids to production and distribution, iron-works, potteries, and cotton-mills sprang up apace, and by the end of the century Great Britain had available for export such a volume of surplus products as the world had never yet seen (1933:195).

Consequently it is no surprise that the bulk of goods found on British colonial sites are of British manufacture.

Initially the American trade situation was hampered by the fact that a war had been waged on American soil. It did not endure as Marshall (1990:129) states:

> After the War of Independence, America's shipping industry was in disarray, but it quickly recovered.

> It had a vast supply of soft-wood timber, skilled shipwrights, and a number of well-placed shipyards.

In addition, the American export economy benefited from its base in agriculture and raw materials which complemented the import, by the Americans, of British manufactured goods. By the late 1780s, with the revival of international trade, the United States returned to its pre-war prosperity (Henretta and Nobles 1987:223).

Following independence, Americans resumed the importation of quantities of British manufactured goods. During the late eighteenth and early nineteenth centuries Americans were laying the foundations of self-sufficiency through the practice of household manufacturing (Henretta and Nobles 1987:231). Thus, the United States began to rely on the importation of manufactured goods to supplement what they could produce themselves.

During the period from 1780 to 1810 Britain was an established trading force and the trade of the United States was in ascendancy. In the early 1780s Britain secured passage through the Dutch East Indies which resulted in an increase in Britain's trade with China (Marshall 1990:124). It did not last. British trade with China declined in the late eighteenth century because "...the competitive production of English earthenware potteries seriously reduced the demand for Chinese blue and white export porcelains in Europe" (Fischell 1987:93). A shift occurred in Western trade with the Chinese

when the Europeans no longer found the China trade profitable (Fischell 1987:71). However, the China trade proved very profitable for the Americans who in their fifty years of association with China made a greater profit than the British East India Company (Fischell 1987:72). The number of American ships docking in Canton illustrate both this change in trade relations and the rise of the American shipping industry. Armstrong (1969:47) states of the number of American ships docking in Canton: "In the season of 1790 there were only 6; in 1800 there were 23 and in 1804 36 out of a grand total of 79, only 39 of which were English".

In the early 1790s, when Spain and France were at war, Britain enjoyed sanctioned trade with the Spanish colonies (Wright 1971:152). It is likely that trade occurred illegally before and after this period.

Before the turn of the century Britain was well into a war with France. Although there were periods during this conflict when Napoleon held the upper hand and was able to limit the range of British trade the war did not permanently upset Britain's powerful position in the world economy (Armstrong 1969:48). In fact, Fayle states that during this period:

> The ships of France, of Holland, and of every other country brought into the orbit of the Napoleonic system, were swept into British ports as prizes, or bottled up in their own harbours by blockading squadrons. Meanwhile British manufactures and colonial products were being distributed all over the world by British ships, or by neutral ships with a British license (1933:196).

The practice of privateering during wartime effected the circulation of goods during late eighteenth and early nineteenth centuries. Minchinton and Starkey (1987:252) point out that privateering was one of the important forms of economic warfare on the sea where one nation would "...attempt to destroy the enemy's commerce and thereby sap his fighting strength". Privateering was practised by all nations, the French, Dutch, Americans and British. A privateer is defined in *The Shorter Oxford English Dictionary* (1973:1674) as "An armed vessel owned and officered by private persons, and holding a commission from the government, called 'letters of marque', authorizing the owners to use it against a hostile nation, and esp. in the capture of merchant shipping". Minchinton and Starkey (1987:257) distinguish between two kinds of privateer sailing the seas during the period of the American War of Independence; first, private men-of-war which carried no cargo and flying their own ensign actively searched for enemy merchantmen and, second, the armed traders which were ordinary merchant vessels carrying letters of marque so they could legally capture enemy vessels they encountered on their normal trading voyages. Essentially wartime saw the rise of privateering, an activity that increased with the addition of participating nations (Minchinton and Starkey 1987:269).

Generally speaking Atlantic trade in the late eighteenth and early nineteenth century was dominated by the British with

significant activity by the Americans, French, Spanish and Dutch. Fayle's observations presented at the beginning of this section reveal the correlation between the economic and political spheres. Much of the conflict between nations during this period involved control over economic markets. Britain and the United States were at different stages in their economic development. The manufacturing nation, Britain, dominated trade while the new nation, the United States, with an economy based on agriculture and raw material exports, was a rising force in international trade. Industrialization was under way in Britain while self-sufficiency was just beginning in the United States. The distribution of goods occurred through both sanctioned and illegal trade between nations. Privateering during wartime also served to redistribute goods from all trading nations including the Americans, British, French, Spanish and Dutch. With a general understanding of Atlantic trade established the local spheres of Virginia and Bermuda will be discussed.

BERMUDA: THE ECONOMIC SITUATION 1780-1810

At present, Henry C. Wilkinson is the only historian who has focused on Bermuda. Unfortunately, his approach is more descriptive than it is analytical. Brown et al. (1991:5.16) commented of Wilkinson's book *Bermuda in the Old Empire*: "While a source rich in descriptive detail, it is very incompletely referenced and, of course, not based on the

systematic examination of the public documentary record". This is also true of Wilkinson's *Bermuda from Sail to Steam*. Nevertheless, Wilkinson does offer a view on the island's economic situation which is useful for a consideration of the archaeological record. He believes that Bermuda occupied the position of underdog in the international economy. In 1781 William Browne became the governor of Bermuda. When Browne arrived on the island on the 16th of December 1781 "He found that there was in reality a serious lack of food and especially of bread, and that prices were exorbitantly high" and rents were at "...an unprecedented figure" (Wilkinson 1950:426). Bermuda's food shortage problem was a result of not having enough arable land on the island to support the population. Thus Bermuda was put in an interesting situation. As a British colony Bermuda had certain obligations to the mother country, yet because the bulk of her food and trade came from the western hemisphere, Bermuda had to remain flexible in her trade relationships (Wilkinson 1973:8). More than once Bermuda had to lift a total ban against American food to avoid a famine (Wilkinson 1973:12). Wilkinson (1973:248) states that by 1808 "Supplies from the United States were not impossible to obtain" and there was always "...the obliging Spanish settlement on the St. Mary River between Georgia and Spanish East Florida which, as in old times, could be counted on for lumber and provisions".

Bermudians made attempts at agricultural production

throughout the period, but crops of arrowroot, cotton and barley had only limited success (Wilkinson 1973:28). Bermuda's entrepreneurs focused mainly on the more secure, profit-oriented lines of work such as, ship building, the salt trade and, during wartime, privateering. All three of these activities shifted between periods of great activity and lull. The salt trade with the Turks Islands had good and bad years, and trade was especially active during wartime when there was an increased demand for salt to pickle foods for the armies (Wilkinson 1950:386). Privateering was practised throughout wartime and certainly was profitable for some. Changes in the laws regarding privateering, made and enforced during the Napoleonic wars, hurt some privateers and made subsequent investors more cautious (Wilkinson 1973:123), but it remained an important activity on the island. Ship building was a healthy industry all through the period until the early 1800s when the demand for Bermudian ships started to wane.

Another part-time occupation of some islanders was salvaging. Bermuda could usually count on bad weather to drive three or four foreign ships a year onto the reefs, and there usually "...was no way for such vessels to pay their crew or meet their passengers' needs except by disposing of their salvaged cargo for cash..." (Wilkinson 1973:201). Although this was a bad situation for the ship, Bermudians benefited from some of the goods sold and in payment for salvaging.

The threat of an American assault was felt by Bermudians almost constantly because of the American War of Independence and later the Napoleonic wars. For this reason Britain was encouraged by the island's politicians to keep some kind of military force on the island throughout the period. This maintained a trade link with Great Britain as she supplied the men with provisions.

In hopes of improving the economy of the island, attempts were made in the late 1700s and early 1800s to make Bermuda a free port (Wilkinson 1973). Although periodically selected goods were exempted from taxation and some restrictions were reduced, Great Britain would not grant Bermuda free port status. This limited the potential of Bermuda's economic growth.

For the most part the Bermudian economy seemed to be disrupted both during peace time and wartime. Though wartime saw the interruption of normal trade routes it also saw times of reduction of protectionist trade restrictions (Wilkinson 1973:200) allowing for temporary indulgence. In addition, privateers were active during wartime providing another source of goods for the islanders. On the other hand, peace time saw the reinstatement of the strict trade restrictions and the general post-war economic turmoil. It was expected that the truce with France in 1801 would give Bermuda some economic relief, but instead, Wilkinson (1973:205) tells us, that "...prices dropped, and vessels remained empty and unsold.

Bermuda soon showed many signs of dearth". Either Bermuda seemed to be experiencing economic disruption or be under threat of one.

Thus the view of Bermuda's economy offered by Wilkinson is one of variable periods of trade swinging from intervals of shortages to times of indulgence. The American War of Independence and the Napoleonic Wars at the beginning and end of the period seem to have seen the highest commercial activity on the island, at least partially because of the need for salt to pickle food for the armies (Wilkinson 1950:386). In spite of this, Bermudians seem to have lived with the almost constant threat of economic disruption. Fortunately, Bermuda occupied a unique niche in the economic system between the United States and Britain, taking advantage of America's willingness to help as well as the obligation felt by Britain for one of her own colonies.

Jack P. Greene (1988) presents a more socially oriented view of Bermuda. Greene's study covers the seventeenth and eighteenth centuries and deals with the development of the British colonies and what later became America. Greene (1988:152) briefly summarizes the Bermudian economy as having abandoned the production of tobacco in the late 1600s and

> Thereafter, although the colony continued to produce some foodstuffs for internal consumption as well as onions, palmetto fronds, and cedarware for export, it directed its primary economic energies to building ships from its privateering (during wartimes), and salt collecting in the Turks Islands.

Greene (1988:153) claims that even though, during the

eighteenth century, a few people made their fortunes through the pursuit of these activities the country did not offer "...enough economic opportunity to attract immigrants or to enable many people to acquire much wealth". In spite of this, Bermuda's population did increase enough to put significant pressure on food procurement forcing the colony to rely on the importation of food. The base for Greene's conclusion about the relative wealth of Bermudians is not clear.

Greene also discusses the demography of Bermuda. He (1988:153) observes that the population of slaves on the island in the mid-eighteenth century was increasing, and by 1764 "Of an average of 9.7 members per household...4.6 were black and 5.1 white". Slaves worked as general labourers, shipwrights, sailors and domestic labourers (Greene 1988:153). In addition, the small size of the Bermudian population ensured that after a few generations many of the families on the island had some kind of kinship connection. Although this 'relative' situation did not make Bermuda unique in the colonies of British America, the transient Bermudian population did, "Because at any one time as many as a fifth to a third of white males were at sea and because both the emigration rate and the death rate among the male seafaring population were high, Bermuda always had a considerable surplus of women from the late seventeenth century on" (Greene 1988:154).

No doubt Bermudian demographics are inter-related with

the Bermudian economy, but it is not clear from Greene's discussion exactly what the connection is or why, in his opinion, it is detrimental to the economy. It is clear that Greene sees the lack of a major Bermudian export as a serious economic deficiency.

Donald Meinig (1986), presents a different perspective. Meinig recognizes, like Greene, that Bermuda had no major export and a fluctuating population. Yet, Meinig (1986:161) recognizes that because of their lack of export crops Bermudians became involved in "...seafaring and the development of other islands and coasts". Their ship building became important and they "...were widely involved as carriers of cargo in the developing Atlantic system". Meinig (1986:162) observes that "Bermudians had wide-ranging connections, not only through commerce, but through the links with those who left, year after year, to seek opportunity beyond this crowded little isle." Based on this and the tourism Bermuda enjoyed during the winter months, he concludes that "Bermuda was, therefore, a significant point in the spatial systems of the Atlantic world."

The available literature on the history of Bermuda is thus unclear on exactly what position Bermuda held in the international economy. Wilkinson's view is that Bermuda was frequently on the brink of disaster. Wilkinson's presentation is melodramatic. Although it is clear that Bermuda had food shortage problems, no one died of starvation. Bermuda always

managed to provide for herself through her trade connections with Britain and the United States. The significant controversy is between Greene and Meinig whose evaluations of the same factors result in a negative and a positive interpretation respectively. Greene perceives the lack of major export as crippling, while Meinig focuses on Bermudians' commercial ventures spawning from the need to look elsewhere for income. Greene interprets the demographic situation as doomed, while Meinig highlights the networking done by Bermudians. Ultimately Greene views Bermuda as going nowhere, while Meinig sees her position as pivotal. These conflicting interpretations of the same facts provide an opportunity for an archaeological examination. No doubt an examination of the artifact assemblage from the Tucker House in St. George's, Bermuda will shed more light on the economic situation of the Bermuda inhabitants.

VIRGINIA: THE ECONOMIC SETTING 1780-1810

In contrast to the Bermuda situation, much attention has been paid to the history of the Chesapeake region. Many of the Chesapeake accounts focus on the political history of the time, but the social and economic past of Virginia has not been neglected. Unlike the perspectives on Bermuda's past, there is agreement in the accounts of Virginia's history for the late eighteenth and early nineteenth centuries. Virginia was in a period of economic fluctuation from the late

eighteenth to early nineteenth centuries.

In 1780 Virginia was embroiled in the American War of Independence, a period that saw much plundering and the loss of many of mercantile class who had returned to Great Britain (Dabney 1971[1927]:155-6). The main Virginian port, Norfolk, was well on the road to recovery after having been all but destroyed by fires set by the British and American soldiers in 1775 and 1776 (Wertenbaker 1962:65). Although there was some trade with the French in Norfolk before 1783, it was not until after the war that ships laden with goods of European manufacture from Great Britain and Scotland returned to the Capes (Wertenbaker 1962:76). Fortunately, the war did not harm Virginia's greatest resource, the land, and she was able to produce the vast amounts of tobacco sought by the Europeans (Schaffer 1964:155). Although Norfolk's trade was increasing, it did not reach its full potential. America was trading with Britain, but Britain was not opening up West Indian trade to the Americans. The British proved so powerful on the international economic scene that the minor European nations could not compete, and the British monopolized the trade of tobacco (Schaffer 1964:158).

The relative economic boom enjoyed by Virginia after the conclusion of the war did not last long. The population soon felt the effects of the "...order in council...restricting the trade between the United States and the British colonies to a limited number of articles to be carried exclusively in

British vessels" (Wertenbaker 1962:76).

Virginians turned to their own political leaders to retaliate. In 1788 Virginia joined the Union, unfortunately, the situation did not improve. The tobacco trade, which was the main staple of the Virginian agricultural economy, had been declining since the autumn of 1785 (Schaffer 1964:163) and some planters expanded their wheat acreage (Wertenbaker 1962:82). As fine flour became more important, many planters along the James River began sending their grain out to be milled in New York or Philadelphia. Local millers could not produce a fine enough product. This practice stimulated Norfolk's northern trade (Wertenbaker 1962:83). Another factor that helped Virginia's economy was her variety of exports. In addition to flour and tobacco, Virginia's products included beef, pork, pitch, tar, turpentine, hemp and lumber (Jones 1964:124).

The outbreak of war in Europe in 1792 further stimulated the Virginian economy. Britain was occupied in other parts of the world and America was able to take advantage of Britain's inability to enforce her navigation acts in the West Indies as well as increasing trade with Britain and her colonies (Wertenbaker 1962:84). Moreover, during this period Virginia's shipbuilding industry flourished, further enriching the economy (Wertenbaker 1962:85).

Unfortunately, Virginia's prosperity did not last. As the Napoleonic wars continued, American ships were privateered

by both the British and the French, acts that severely harmed Virginian merchants (Wertenbaker 1962:95). In 1807 President Jefferson, in an effort to alleviate the problem, passed the U.S. Embargo Act against Britain and France. Jefferson's logic was that "When Britain realized that the American market was closed to her manufactures, he thought, that her imports from the Unites States were cut off, that her West India islands were suffering for provisions, she would be forced to do us justice" (Wertenbaker 1962:104). The embargo actually paralysed the American shipping industry, and Norfolk, like the rest of Virginia, was severely affected.

It was not until 1809, when the Act was repealed, that Norfolk saw greater trading activity. Wertenbaker (1962:108) states,

> True, non-intercourse with Great Britain and France was continued, but even the most inexperienced trader knew that there were ways of circumventing this restriction. He could take on flour, beef, tobacco, or lumber, secure clearance papers for some Spanish port, and upon his arrival there sell his cargo to Frenchmen or Britishers, who, in turn, would take it to France or England or one of their colonies.

In spite of the repeal, trade did not return as before. The seizures of American vessels continued, and prices were down. It seemed that "...non-intercourse was a failure, for instead of stopping trade between the United States and Great Britain, it merely aided British shippers at the expense of Americans" (Wertenbaker 1962:109).

In summary, after the American War of Independence Virginia saw a brief period of prosperity after which she had

a period of depression. With the resumption of war in Europe Virginia saw increased trade, but also losses through privateering. Her tobacco trade, which seems to have seen her through the worst, was monopolized by Great Britain so did not bring as much prosperity to Virginia as she deserved. Finally, Jefferson's U.S. Embargo Act in 1807 sent Virginia into another period of trade restrictions from which she did not fully recover until later in the nineteenth century when trade opened up anew.

Both Bermuda and Virginia were cut from the same cloth, beginning as British colonies. Both were, in the words of Greene, (1988:152) growing "...toward the establishment of an ever more coherent, settled, and Europeanized society" and both areas experienced periods of economic flux. Yet Bermuda and Virginia are two very different economies. While the former relied on only a few industries such as shipbuilding and the salt trade, Virginia had a more diversified, resource-oriented production based on tobacco, flour, pitch, tar, turpentine, and lumber. In addition, Bermuda, being a British colony, was directly affiliated with the international trading power whereas Virginia, associated with America, represented an emerging competition.

From the above it is clear that neither Bermuda nor Virginia experienced economic success. Bermuda had to look to Britain and America for support, and Virginia's economic potential was not fully realized for reasons outside her

control. The question remains whether Bermuda's position as a British colony with ties to the United States was more advantageous in terms of the availability of consumer goods than Virginia's export economy. The comparison of archaeological assemblages from both locations will address this issue.

WILLIAMSBURG, VIRGINIA AND ST. GEORGE'S, BERMUDA

There are parallels in the histories of St. George's and Williamsburg that strengthen and promote the suitability of a comparison between the two. A brief account of the development of these two towns is given below, followed by an inventory of the glass and ceramic available in the two locales.

Both St. George's, Bermuda and Williamsburg, Virginia were sufficiently important to serve as capitals early in their existence. The period of waning of St. George's as a capital began in 1780. The location of the capital at the eastern end of the island was impractical with increased shipping as nine-tenths of all traffic occurred outside of St. George's (Wilkinson 1973:51). In spite of this problem St. George's remained the capital of Bermuda until 1814 when it was moved to Hamilton, near the middle of the island.

Williamsburg was just a bit ahead of St. George's. In 1781 the capital of Virginia was changed to Richmond. Although the change was accompanied by some shifting of the

population the old capital was not abandoned and that, in fact, "...it remained an important local urban center" and that the urban elite accumulated a range of luxury goods (Smart 1986:20).

The physical locations of the two towns would suggest that their situations were dissimilar. St. George's was a port on an island, Williamsburg was located inland. Neither town was the hub of the shipping industry in their area, but both were significant centres in their own right and seem to have supplied their populations with a wide range of goods.

WILLIAMSBURG AND ST. GEORGE'S: AVAILABLE GLASS AND CERAMIC GOODS

My original intention was to compare ads from the local newspapers from St. George's and Williamsburg to see exactly what glass and ceramic material was available to consumers. Unfortunately, Williamsburg's newspapers moved to Richmond, the new capital, in 1781, the beginning of the period of study.

The few Williamsburg newspapers available from 1780 on offer little more than a general sense of the ceramics and glass wares available. The ads listed were for public auctions, individuals and stores. The items for sale include: china cups and saucers (*Virginia Gazette* [*VG*] 1780, 52:4); "...beft London porter by the cafe or dozen,..." (*VG* 1782, 6:4); and "...a quantity of glafs ware and table china,..."

(VG 1783, 59:3). A Williamsburg store ad from December in 1783 lists goods such as tumblers just imported from France (*VG* 1783, 105:1). Patrick Roberston was selling Queen's china at public auction in June of 1784 (*VG* 137:4). An estate sale in February of 1782 lists "...a quantity of CHINA, Queen's china and glafs ware,..." among the goods (*VG* 6:3). In addition there are a few ads which include items that would be in glass vessels like medicines and essences.

The research of Anne Morgan Smart using personal property tax lists shows that in 1815 Williamsburg's population consumed a variety of luxury goods (1986). She found that the consumption of a household reflected its economic position. She concluded that "Although ceramics were not specifically taxed in 1815, general high-style dining-related objects were clearly linked to one's economic position, and people in varying economic classes consistently chose these types of objects to exhibit their wealth" (1986:145). Smart (1986:142) found that the Williamsburg elite displayed their status by having "...a greater range and higher quality of luxuries and amenities than were found in other households." The Williamsburg archaeological deposits, representing a high-status group, should therefore reflect the glass and ceramic goods available.

Cut glass, which was quite expensive, was taxed in 1815. Smart found that cut glass was one of the few items that was consistently restricted to the upper classes in Williamsburg

(1986:85).

An analysis of store records from 1784 to 1785 reveals that the Anderson and Low store in Williamsburg supplied its patrons with tablewares and teawares. The majority of the ceramics supplied were Queen's ware in the forms of plates, bowls and mugs (Whitney 1983:43). Some of Whitney's (1983:43) statements regarding the ceramic desires of Williamsburg consumers seem contradictory. She stated that "Anderson and Low's patrons preferred aesthetic items to functional housewares," but she goes on to say that "Customers generally selected 'the useful & neat rather than the Ornamental....'". Paraphrasing Ivor Noël Hume Whitney (1983:44) stated that "In his Williamsburg excavations, however, Ivor Noël Hume has found few highly decorated earthenwares. Williamsburg residents preferred unadorned wares or those with a coloured band circling a shell edge." It is true that in his 1973 article Noël Hume (242) stated of pearlware that "Most of the common tableware was virtually undecorated save for a blue or green ornamenting of the shell edge," but nowhere did he claim that Williamsburg residents *preferred* undecorated wares.

Whitney's observation regarding undecorated wares may apply to the 1780s, but not necessarily beyond. Noël Hume (1973:239-40) wrote of creamware in general that "The sudden diversity of colored decoration on creamware in the late eighteenth century can be explained in part by the fact that the public had tired of the once attractively clean appearance

of Queen's ware, and in part, by the growing popularity of blue printing on pearlware". The ceramic assemblages from Williamsburg reflect this with quantities of undecorated creamware sherds, but there is some decorated creamware as well. The pearlware sherds found at the Barraud and Peyton Randolph sites also support the trend towards decorated wares with a ratio of undecorated to decorated wares smaller than that for the creamwares. The point is that the Williamsburg consumer's focus on undecorated ceramics was a factor in the 1780s, but not necessarily beyond. Whitney (1983:44) says little about glassware except that tumblers, wine glasses and decanters were purchased.

The York County probate inventories are another source for material goods available in Williamsburg. The inventories for James County, which included Williamsburg, were destroyed by fire in Richmond during the Civil War. An overview of the York County material will add to the glimpse of the glass and ceramic available in the area.

An inventory of a merchants' goods during the period list the following ceramic ware and decoration types: China, Queen's china and vessels decorated with blue and green edging, with blue and white, red and white and with a 'French Grey Border' (Colonial Williamsburg Archives [CWA] 1783:410-416, 1805:666-669). A store inventory taken in 1798 lists 'black' tea wares, blue and white delft and Queen's china (CWA 1798b:510-512). A 1780 inventory lists 'Earthen' dishes,

China, Stone pots (CWA 1780:469-470). Ceramic vessel forms listed include plates, soup plates, coffee pots, tea pots, tea sets, bowls, cups and saucers, sugar dishes, milk pots, milk pans, mugs, tureens, butter boats, mustard pots, wash bottles and basins, baking dishes, jugs and tart moulds. A variety of glass ware is listed in the probate inventories but most of it is plain. The only specifically mentioned decoration is 'flowered' wine glasses in one of the merchant's inventories (CWA 1783:410-416), another inventory cites blue glass (CWA 1798a:506-509). The vessel forms listed from all the inventories are: wine glasses, tumblers, decanters, salts, sugar dishes, plates, salvers, jelly glasses and bottles.

The inventories of the merchants list a variety of items that are sold in containers including bottles of pickled walnuts, mustard, castor oil, preserves and snuff. It is not clear from the inventories if these are glass or ceramic vessels.

This review of primary and secondary sources reveals that a variety of glass and ceramic wares were available to Williamsburg consumers from 1780 to 1810. A number of vessel forms and decorations have been identified as occurring in York County, and it is likely that Williamsburg inhabitants would have had access to at least a similar range of goods.

The picture of wares and forms available to consumers in Bermuda is more complete thanks to the advertisements from *The Bermuda Gazette*. In the period from 1784 to 1809 a variety of

ceramic and glass goods were advertised. The advertisements are primarily from stores, individuals and public venue, including estate sales and prize goods. Of the goods imported and sold in stores the majority came from London (some via Barbados), some from Glasgow, in the 1780s, and a few loads from Liverpool. The majority of the references are only general references to glassware and china or earthenware, but some are more specific. Queen's ware is advertised throughout, but there are specific decoration types listed periodically, and these are: 'Painted Queen's Ware of different Sorts"(*Bermuda Gazette* [*BG*] 1784, 2), "A variety of variegated Queen's ware" (*BG* 1784, 21), "affortment of green and blue edged cream coloured China and Glazed Ware" (*BG* 1787, 193), and "plain and gilt queen's ware" (*BG* 1805, 1099). In addition to the Queen's ware there are references to different ware types: "10 Dozen Liverpool China Cups and Saucers" (*BG* 1787, 165), "Blue and white china plates....Enamelled and gilt ditto..." (*BG* 1787, 188), "feveral forts of neat plain and fancy Wedgwood's ware, fuitable for genteel families (and to be fold nearly as cheap as Queen's ware)" (*BG* 1790, 341), "Crockery Ware" (*BG* 1794, 527), "a fet of tea china, gilt, and uncommonly elegant" (*BG* 1796, 662), "a few fets red and white china cups and faucers" (*BG* 1797, 680), "A Quantity of Brown Ware" (*BG* 1797, 667), "One table fet nankeen china" (*BG* 1797, 704), "a large affortment of earthen, Delph and Chelfea china ware" (*BG* 1797, 705), "Black Egyptian tea pots, Milk pots and

fugar difhes, Red tea-pots" (*BG* 1797, 715), "coffee cups and faucers of fluted ware" (*BG* 1798, 731), "Staffordfhire china cups and faucers" (*BG* 1802, 946), "A handfome affortment of blue and white printed ware" (*BG* 1805, 1118), and "A double fet of brown and white Englifh Ware, with Defert fet complete" (*BG* 1809, 1314).

A variety of ceramic forms are advertised in addition to the usual plates, bowls of different sizes and cups and saucers. The additional forms include: "Six-Pint two Quart, Quart, and Pint China Bowls, and Mugs, ditto Half Pint Bafons and Saucers, Tea and Coffee Cups and Saucers" (*BG* 1784, 30), "Gallipots" (*BG* 1787, 162), "Table Sets of blue edged Ware compleat" (*BG* 1789, 284), "pint and quart earthen mugs" (*BG* 1791, 370), "...and china tureens, bowls" (*BG* 1791, 381), "fets of black Egyptian or Wedgewood's ware; blue and white mugs and bowls; pepper and falt mugs, bowls, cups and faucers; crates of queenfware plates, foup plates, and flakes; chamber pots; crates of brown crock ware, containing quart, pint and half pint mugs, bottles, jugs, pickle pots, chamber pots, porringers, bowls and pudding pans" (*BG* 1796, 640), "an affortment of earthen ware, confifting of large difhes, foup plates, defert ditto, large oval difhes, bowls, wafh hand bowls, pint mugs, muftard pots, pepper boxes, fifh drainers, milk difhes, fallad bowls, cheefe plates, quart bowls, foup tureens, fauce boats, vegetable difhes, jugs, fpitting boxes, coffee pots, &c.&c." (*BG* 1789, 733), "China fnuff boxes" (*BG*

1800, 849), "Half pint breakfaft cups and saucers" (*BG* 1802, 951), and "Dinner and breakfaft fets, mugs, water ewers, Bafons, and other family requifites, Breakfaft fets of Black Wedgwood" (*BG* 1807, 1240).

The glass ware types and vessel forms are not quite as diverse as the ceramics and are as follows: "A neat affortment of Briftol glafs" (*BG* 1784, 49), "plain and cut glafs ware" (BG 1793, 517), "glafs ware cut, engraved and plain afforted" (*BG* 1795, 586), "cut and fluted decanters..." (*BG* 1798, 759), "Fancy glafs fmelling bottles" (*BG* 1800, 849), and "beft flint and common glafs" (*BG* 1809, 1300).

The glass vessel forms advertised are as follows: "3 pint glafs decanters, quart do. pint do. Glafs tumblers, wine glaffes" (*BG* 1784, 21), "Phials" (*BG* 1787, 162), "wine, ale, and arrack glaffes; quart decanters,...a few pair elegant glafs fhades, with glafs candlefticks" (*BG* 1789, 263), "Quart and pint flint glaffes; half gallon and quart ditto; tumblers with covers, pint and half pint tumblers, quart and pint ground decanters; wine and water glaffes, rummers, &c.' (*BG* 1791, 365), "large elegant Glafs Lamps" (*BG* 1795, 572), "glafs ware, confifting of quart and pint decanters, cruets, goblets, tumblers, wine glaffes and falts" (*BG* 1796, 640), "quart, pint, plain and ring decanters; glafs fliding fhades in brafs frames; quart, pint and half pint goblets with covers; ditto tumblers, plain wine glaffes, foy and vinegar cruets...glafs finger cups,...glafs butter tubs in ftands" (*BG* 1797, 697),

"...Butter flaffes, punch glaffes with covers, Wafh glaffes, water decanters" (*BG* 1797, 708), "...pickle difhes, butter coolers and blue finger cups" (*BG* 1803, 986), "...pyramid jelley glaffes, trifle difhes" (*BG* 1807, 1224), "Glafs Ware, confifting of India candle fhades, globular lamps, Sets of cut cruets and caftors, with plated and morocco frames, Do. do. liquor bottles in do. Tumblers and wine and water glaffes, plain and cut, wine do. do. falts do. Decanters and vinegar cruets do." (*BG* 1807, 1240).

In addition to the glass and ceramic tablewares sold there are a variety of goods sold in glass and ceramic containers. What follows is a list of only those items specified as coming in the various vessels. Bottled goods include: perfumery, porter, beer, ale, sherry wine, brandy, Claret, cider, Madeira wine, ketchup, a variety of patent medicines, snuff, castor oil, lavender water, rose water, mustard, anchovies, tea, best bark, sweet oil, honey, ink, oil of peppermint, current juice, current jelly, barley, and fish sauces. Items listed as coming in jugs are: linseed oil, paint oil, turpentine, gin, and vinegar. Jars contained: flax-seed oil, linseed oil, raisins, paint oil, olive oil, honey, sweet meats, sweet oil, hogs fat, tallow, olives, Malaga grape seed in earth, varnish, and nougat. Scented pomatum, oysters, mustard, preserves, spiced salmon, butter, confectionary and paint were sold in pots. Medicines were available in bottles and phials.

From this review of the advertisements in *The Bermuda Gazette* it is clear that there was a variety of glass and ceramics available on the island. It is difficult to compare the surveys of Williamsburg and St. George's as they are compiled from different sources. The understanding of the available goods in Williamsburg has been limited by the procurable documentary sources. Subsequently, the goods stocking Bermuda's shelves appear lavish. The quantification in Chapter Five shows that the glass and ceramic assemblages from the Tucker House, Barraud, and Peyton Randolph sites are at least reflective of the ware and decoration types described in the ads. In the case of the Williamsburg sites the assemblages extend beyond the range of ware and decoration types listed. The Barraud and Peyton Randolph assemblages represent the vessel forms inventoried more completely than those from the Tucker assemblage reflect those advertised. It is fortunate that we have the benefit of the ads to show that vessels like sauce boats were being sold.

THE TUCKER HOUSE, BARRAUD AND PEYTON RANDOLPH SITES

The final section in this chapter provides a brief history of the sites involved in the comparison. The pertinent information about the assemblages is general, as this is a comparison of neighbourhoods with material from domestic sites. By examining material from a general perspective we can use a household assemblage to answer

questions on the global level. In the case of St. George's and Williamsburg the assemblages to be studied are from domestic sites that reflect households of high socioeconomic status.

The assemblage from Bermuda comes from the deposits inside the Tucker House that date to the period of Henry Tucker. In 1775 Henry Tucker, who later became President of the Council, bought the property and occupied the site for about 25 years. Tucker was a man of considerable status in Bermuda's political sphere. This assemblage is a good example of the upper level of Bermudian social society.

The Peyton Randolph assemblage, from Williamsburg, comes from a refuse layer that appears to have been deposited as fill brought in from elsewhere. It is doubtful that the material came from very far away, and since the surrounding area reflects a similar social status in Williamsburg as the Tucker House material does in Bermuda, it was felt that the Randolph refuse deposit would be suitable for comparison. However, it was decided that the study could only benefit by the addition of another Williamsburg site, the Barraud House.

The Barraud House material, also from Williamsburg, comes from a trash pit filled with household garbage dating to the 1790s, Dr. Barraud's occupation of the site. Dr. Philip Barraud owned and resided on the property from 1783 until 1801. Based on his occupation as a physician and his practising in an urban setting it is probably safe to assume

that Dr. Barraud enjoyed a relatively high socioeconomic status.

The material from these three sites forms the data base to test whether household assemblages reflect a location's connection to the international trade network. Chapter Three explores the application of three tools in the study of trade networks in historical archaeology: South's pattern recognition, Miller's status indexing and Zierden and Grimes's status measures.

SUMMARY

This review of the period from 1780 to 1810 has shown that Bermuda and Virginia occupy different niches in the international economy. Bermuda had a number of external connections, including the United States and Britain, and focused on commercial ventures off the island. Virginia had the benefit of a number of exports, but, being an American state, had a different relationship with Britain. The documentary sources indicate a range of glass and ceramic wares available in Williamsburg and St. George's. From here the discussion will focus on the methods of analysis and the glass and ceramic assemblages from the three sites chosen for comparison. This inquiry aspires to relate the glass and ceramic goods found in the households of St. George's, Bermuda and Williamsburg, Virginia, to the position held by each local in the international economy. This should reveal whether the

perspective taken by Greene or Meinig is more accurate regarding Bermuda's status in the international trade network.

CHAPTER 3

SOUTH, MILLER AND ZIERDEN/GRIMES

INTRODUCTION

This chapter is a review and application of three standard analytical tools in archaeology: South's pattern recognition, Miller's status indexing, and Zierden and Grimes' status indicators. The chapter is divided into seven sections. Two sections are devoted to each of the three method of analysis. The first section is a review of the method, culminating in the potential application in this study. The second section is an interpretation of the results of that application to the archaeological material from Williamsburg, Virginia and St. George's, Bermuda. The final section in this chapter is a summary of the findings.

The purpose of this chapter is twofold. First, it is to explore the potential of alternate applications of the three standard archaeological tools listed above. Second, to test the hypothesis: if sites of the same socioeconomic status from distinct geographic locations occupy different positions in the international trade hierarchy, the positions held will be reflected in the material goods found in the locales. South's pattern recognition will address each location's connection to

the market, and Miller's and the Zierden and Grimes's methods will deal with the quality of goods available in each location. By the summary section of this chapter it will be clear that alternative applications of standard archaeological tools are useful and that Bermuda and Virginia had access to a range of glass and ceramic goods.

SOUTH'S PATTERN RECOGNITION

Since its publication there have been many applications as well as criticisms of South's (1977) approach to pattern recognition. South (1977, 1988) has made it clear that it is not the recognition of artifact patterns that is the goal, but rather the explanation of cultural process through quantitative analysis and pattern recognition. It is doubtful that anyone would deny that South's approach as presented in 1977 is but a starting point. Certainly there are problems, but with modifications South's pattern recognition could become useful. A brief description of South's approach follows with a review of some criticisms and a alternative application for the Bermuda and Virginia assemblages.

South (1977:43) believes that a primary goal of archaeological research is to recognize patterns so that we can question their distinctiveness, regularity and variability. Without the asking of these and other 'why' questions there is no point to pattern recognition. Thus the idea is to identify standard patterns and explain their

existence and then follow through with the comparison of other assemblages so that irregularities can be noted and explained and areas worthy of further study identified. Table 3.1 shows the classification scheme South developed to quantify artifacts. Once quantified, the various groups are to be compared and contrasted in an effort to discover meaningful cultural patterns, which then require explanation. South identified two patterns using his classification scheme: The Carolina Artifact Pattern, and the Frontier Artifact Pattern. The Carolina Artifact Pattern is supposed to reflect the British colonial cultural system, while the Frontier Pattern is supposed to reflect the frontier cultural system.

A number of authors have critically evaluated South's approach to pattern recognition (Stevenson 1983, Benson 1978 and Warfel 1982, 1983). None of these authors dismiss South's work, but they have their reservations and suggestions for the fruitful application of South's methods. Benson (1978) outlined the derivation of the Carolina Artifact Pattern and then, through the quantification of assemblages from homesteads in Connecticut and Aruba, she further tested its applicability. Benson found that both sites fit into South's Carolina pattern which is said to represent the cultural processes of British colonists of the late eighteenth and early nineteenth centuries on the eastern seaboard (South 1977). As the assemblage from Aruba was that of a Dutch Catholic family, Benson felt that the Carolina Pattern

TABLE 3.1

SOUTH'S ARTIFACT CLASSIFICATION FORMAT

Artifact Classes and Groups

Class no.	Class name	
	Kitchen Artifact group	
1.	Ceramics	(over 100 types)
2.	Wine Bottle	(several types)
3.	Case Bottle	(several types)
4.	Tumbler	(plain, engraved, enamelled)
5.	Pharmaceutical Type Bottle	(several types)
6.	Glassware	(stemmed, decanter, dishes, misc.)
7.	Tableware	(cutlery, knives, forks, spoons)
8.	Kitchenware	(pots, pans, pothooks, gridiron, trivets, metal teapots, water kettles, coffee pots, buckets, handles, kettles, etc.)
	Bone group	
9.	Bone Fragments	
	Architectural group	
10.	Window Glass	
11.	Nails	(many types)
12.	Spikes	
13.	Construction Hardware	(hinges, pintles, shutter hooks and dogs, staples, fireplace backing plates, lead window cames, etc.)
14.	Door Lock Parts	(doorknobs, case lock parts, keyhole escutcheons, locking bolts and brackets)
	Furniture group	
15.	Furniture Hardware	(hinges, knobs, drawer pulls and locks, escutcheon plates, keyhole surrounds, handles, rollers, brass tacks, etc.)
	Arms group	
16.	Musket Balls, Shot, Sprue	
17.	Gunflints, Gunspalls	
18.	Gun Parts, Bullet Molds	
	Clothing group	
19.	Buckles	(many types, shoe, pants, belt)
20.	Thimbles	(several types)
21.	Buttons	(many types)
22.	Scissors	
23.	Straight Pins	
24.	Hook and Eye Fasteners	
25.	Bale Seals	(from bales of cloth)
26.	Glass Beads	(many types for wearing or sewing onto clothing)
	Personal group	
27.	Coins	
28.	Keys	
29.	Personal Items	(wig curlers, bone brushes, mirrors, rings, signet sets, watch fobs, fob compass, bone fan, slate pencils, spectacle lens, tweezers, watch key, and other "personables")
	Tobacco Pipe group	
30.	Tobacco Pipes	(ball clay pipes, many types)
	Activities group	
31.	Construction Tools	(plane bit, files, augers, gimlets, axe head, saws, chisels, rives, punch, hammers, etc.)
32.	Farm Tools	(hoes, rake, sickle, spade, etc.)
33.	Toys	(marbles, jew's-harp, doll parts, etc.)
34.	Fishing Gear	(fishhooks, sinkers, gigs, harpoons)
35.	Stub-stemmed Pipes	(red clay, short stemmed tobacco pipes)
36.	Colono-Indian Pottery	(or types clearly associated with the historic occupation)
37.	Storage Items	(barrel bands, brass cock, etc.)
38.	Ethnobotannical	(nuts, seeds, hulls, melon seeds)
39.	Stable and Barn	(stirrup, bit, harness boss, horseshoes, wagon and buggy parts, rein eyes, etc.)
40.	Miscellaneous Hardware	(rope eye thimble, bolts, nuts, chain, andiron, tongs, case knife, flatiron, wick trimmer, washers, etc.)
41.	Other	(button manufacturing blanks, kiln waster furniture, silversmithing debris, etc., reflecting specialized activities)
42.	Military Objects	(swords, insigna, bayonets, artillery shot and shell, etc.)

(South 1977:93 Table 3)

required redefinition as it encompassed a wider demographic than South envisioned. Benson (1978:64) suggested three possibilities: the Carolina Pattern is a measure of domesticity, it may function as an index to determine a site's level of access to economic markets, or it may represent a broader cultural tradition. Benson concluded that the last suggestion is the most likely, and she renamed the Carolina Pattern the Initial European Farmstead Pattern: "the medieval tradition provided the basis by which the initial Europeans successfully adapted to life on isolated, or semi-isolated, family-oriented homesteads on the American frontier" (1978:66). Benson noted that her pattern requires further testing.

Warfel (1982, 1983) did a critical evaluation of South's pattern recognition and applied it to another site. Warfel pointed out a number of problems with South's approach starting with the classification system itself. South's system is multi-tiered and reduces a number of classes into nine basic groups (see Tables 3.1 and 3.2). South stated that "The classes are based on form and sometimes function..." and "The groups are based on functional activities related to the systemic context reflected by the archaeological record" (1977:93). Warfel criticized this classification scheme because he felt that "Historical archaeology must use the entire record of past behaviour to understand cultural process, not just the archaeological record" (1982:142).

TABLE 3.2

SOUTH'S ARTIFACT CLASSES AND GROUPS

Artifact Classification Format

Type	Ware	Material	Class	Group
Blue painted pearlware Polychrome painted pearlware Annular pearlware Edge decorated pearlware etc.	Pearlware	Earthenware	Ceramics	
	Creamware Whiteware etc.		Wine Bottle Case Bottle Tumbler	
		Stoneware	Pharmaceutical Bottle	*Kitchen*
		Porcelain	Glassware Tableware	
		Tinware	Kitchenware	
		Woodenware (treen)	etc.	*Bone* *Architecture*
		Pewterware etc.		*Furniture* *Arms* *Clothing* *Personal* *Tobacco Pipe* *Activities*

(South 1977:95-96 Table 4)

Warfel went on to say that South failed to consult the rich documentary record when devising his classification scheme.

Warfel also criticized the asymmetrical nature of the scheme noting that the bone, furniture and tobacco pipe artifact groups consist of a single artifact class (1982:145). Stevenson (1983) also observed the skewed nature of the system noting essentially that all artifacts are not created equal and carry varying kinds and quantity of information. Bobrowsky and Ball (1989) also warned against this kind of classification scheme in the study of diversity and, no doubt, an unequal classification scheme will produce bias in any kind of quantitative analysis. Further, Stevenson stated that "It is easy to compare artifacts from class to class and group to group by their frequency occurrence, but a lot of information is lost" (1983:66). Certainly the nature of South's classification system affects the patterns recognized, and different patterns would emerge if the whole system was redesigned or at the very least if the one class groups were included in other groups, i.e. pipes with activities or bone with kitchen (Warfel 1982:145).

The exclusion of the bone group in the quantification for pattern recognition was criticised by Warfel as the simple quantification of bone does not require specialized knowledge. Contrary to South's belief, Warfel felt that "...bone found in the archaeological record <u>does</u> represent the same type of human behaviour by-product represented by other groups,

especially the kitchen group..." (1982:145). Warfel also complained that South's management of 'dramatic variation' due to non-specific activities was not clearly explained. How much variation is 'dramatic'? Of this part of the analysis Warfel stated that "There can be no doubt that this procedure has the effect of creating an artifact pattern, rather than discovering one" (1982:146).

Warfel also discovered some inconsistencies in the methodology leading to the recognition of the Carolina Pattern. He recalculated the data from two of South's sites and modifies the Carolina Pattern. He also recalculated the predicted ranges for the Frontier Artifact Pattern when he found he could not duplicate South's. When Warfel applied South's approach to his data he found that for the most part the material conformed to the revised Carolina Pattern. Warfel (1982:184) was careful to conclude that this result was only a preliminary confirmation of South's patterns and that further work must be done, if we are to fully explain both the similarity and diversity found in the archaeological record and get closer to learning about culture process.

Rather than evaluate South's approach Stevenson (1983) examined other researchers' use or misuse of South's pattern recognition. Some of the major problems identified by Stevenson (1983) were: little attempt is made to explain the recognized patterns (i.e. pattern recognition is becoming an end in itself); South's classification system is used without

considering its applicability to material and it is not redesigned to address specific research; blind endorsement of the method and theory of South's approach and little consideration of variables affecting archaeological data. Stevenson felt that one way to avoid some of these pitfalls was to "...search for new methods and analytical techniques allowing the abstraction of pattern" (1983:67).

Ultimately, all three of these authors credit South's pattern recognition as a step towards the explanation of cultural process. All three believe there is potential in the approach. Its value lies in its founding concepts and creative development rather than in the application presented by South. The aim here is to discover if there is some way South's approach to pattern recognition could be applied to the study of international trade networks.

The application of South's pattern recognition to be used with the Bermuda and Virginia material is intended to test the suggestion made by Benson (1978) that the Carolina Pattern may be representative of the degree of access of a homestead. Although there are problems with South's classification system it must be employed if a comparison is to be made with the Carolina Artifact Pattern and the Frontier Artifact Patterns. This comparison will be done on the class and group level, and it may be that this is too general a level of comparison for that purpose. It is probable that some of the ware and type levels of South's scheme, which carry more detailed

information, are better suited to this purpose, but it is beyond the scope here do a more detailed analysis of and comparison with South's system. Through the measurement of diversity in Chapter Five an understanding of the usefulness of the equivalent of South's ware and type level of classification will be examined, and perhaps the applicability of South's system can be extrapolated from that analysis.

According to Benson (1978:64), the expectation is that higher access is revealed in the Carolina Pattern's varied range and basically "...the Frontier Pattern may be seen as indicating attenuation of ties with such a market". As discussed previously, Williamsburg and St. George's are thought to have occupied different niches in the international trade network. It is thought, based on the work of Meining (1986) and Greene (1988), that St. George's occupied a position in the economic hierarchy either below or at least equal to that of Williamsburg. Thus if the latter is true, the Tucker assemblage should be more like the Carolina Artifact Pattern than that of the Peyton Randolph and Barraud deposits, and these two Williamsburg sites should be more comparable to the Frontier Artifact Pattern than the Tucker House site. If the opposite hierarchical positions hold true for these locations, the expected results of the comparison would be the reverse.

SOUTH'S PATTERN RECOGNITION: APPLICATION AND ANALYSIS

The material from the Barraud site, the Tucker House and the Peyton Randolph refuse layer was quantified according to the method proposed by South. The results are listed in Table 3.3 and are graphically depicted in Figure 3.1.

All three sites generally conform to South's Carolina Artifact Pattern (CAP). The characteristic Frontier Artifact Pattern (FAP) ratio of higher percentage of the architecture versus the kitchen group did not occur for any of the sites so there is no obvious correlation to the FAP. Nevertheless, there are some interesting differences between the three sites.

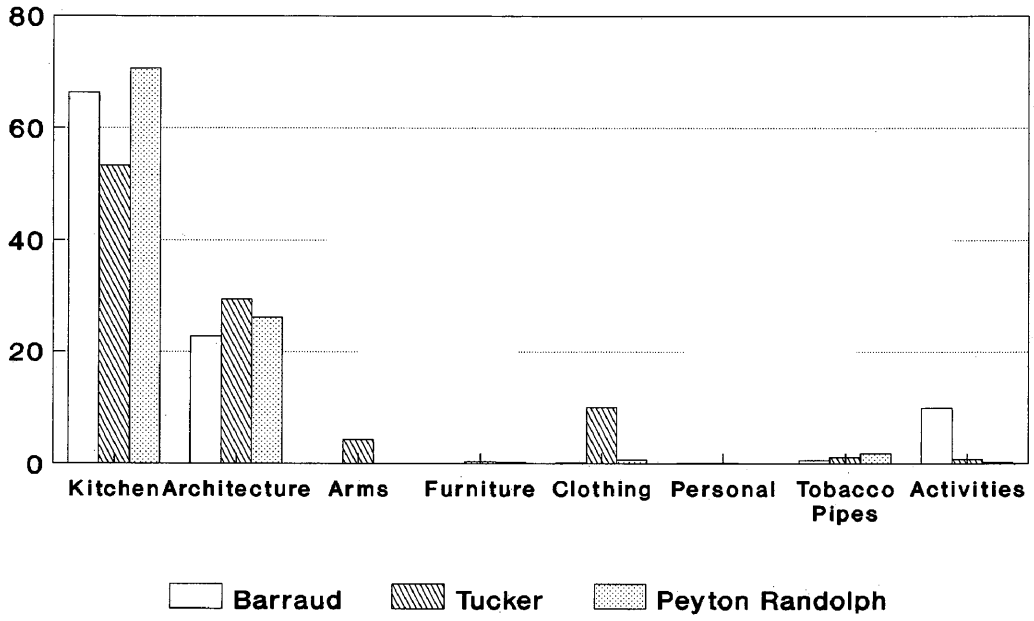
The kitchen groups represented the highest percentages for all the sites. The Barraud and Peyton Randolph deposits were particularly high while Tucker was lower but still within the CAP range. This minor discrepancy may be related to the fact that the Tucker material was excavated from a basement while the other two deposits were not within a structure. It is possible that the Tucker deposit is not as reflective of kitchen waste as the other sites, although the amount of bone recovered from the deposits suggests that this is not necessarily the case. The number of identified species was 16,060 of which 85% were fish remains (Brown et al. 1991). Even so, without the fish, the remaining faunal assemblage is comparable in quantity to that from the Peyton Randolph refuse deposit. Thus the three sites are probably equally

TABLE 3.3

RESULTS OF SOUTH'S PATTERN RECOGNITION

	BARRAUD		TUCKER		PEYTON RANDOLPH	
GROUP	#	%	#	%	#	%
Kitchen	335	66.34	1621	53.40	5519	70.61
Architecture	115	22.77	888	29.40	2042	26.13
Furniture	0	0.00	13	0.40	17	0.22
Arms	0	0.00	133	4.40	1	0.01
Clothing	1	0.19	305	10.10	61	0.78
Personal	1	0.19	7	0.20	5	0.06
Tobacco Pipes	3	0.59	35	1.20	148	1.89
Activites	50	9.90	24	0.80	23	0.29
Total	505	99.98	3017	99.90	7816	98.99

Figure 3.1
South's Pattern Recognition



representative of kitchen waste.

The architecture group has all three sites falling within the range of the CAP with the Tucker deposit registering the highest count. This could be the result of a quantity of nails possibly relating to the wooden floors in the Tucker House basement.

The furniture group was within the CAP range, while the Tucker deposit exceeded the CAP range in the arms group. The Tucker arms deposit was primarily lead shot, most of which came from a single context. Even so, the quantity of arms-related artifacts from Tucker exceeds that from the other two sites. It is possible that St. George inhabitants felt a greater need to arm themselves than Williamsburgers because Bermuda was an island, and the forts were some distance away.

The Tucker material continues to be distinct in the clothing group where it far exceeds the CAP range. This is the result of a quantity of straight pins and buttons. The fact that this deposit came from a basement is probably significant (i.e. pins falling between the floor boards) as well as the smaller screen size used for the excavations in Bermuda.

The personal group has all but the Peyton Randolph deposit falling into the CAP range while the tobacco pipe group is low in all three cases. This may be a reflection of a particular kind of waste, more kitchen-related than personal, especially in the case of the Peyton Randolph

material.

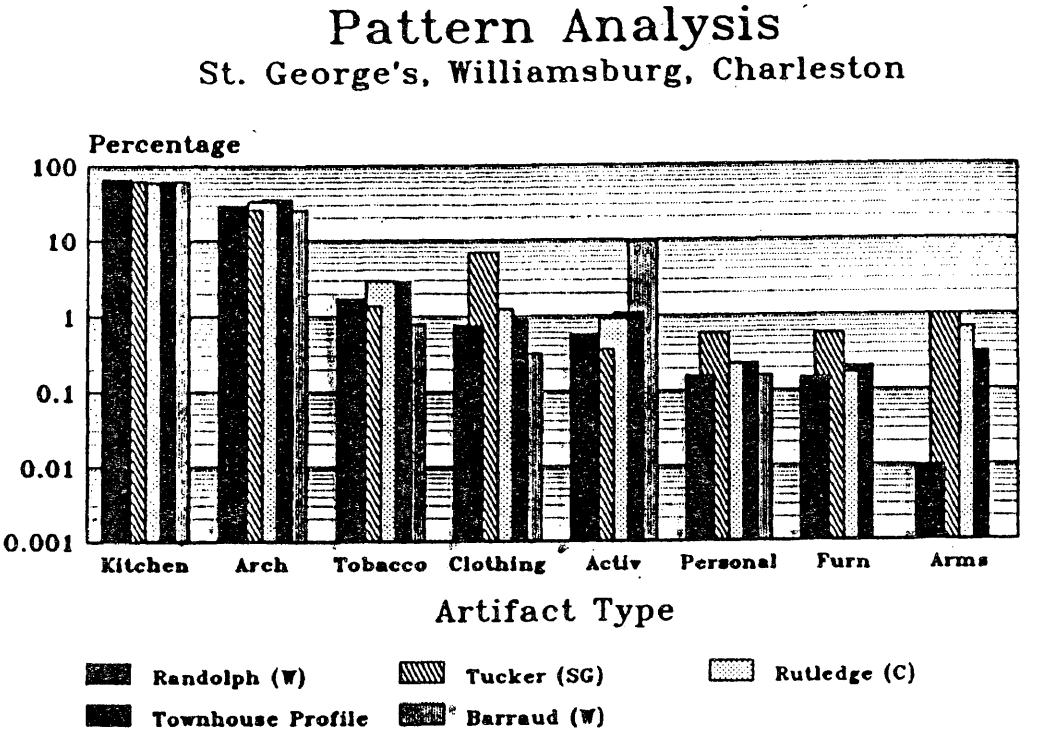
The CAP range for the activities group is higher than that of Tucker and Peyton Randolph while Barraud exceeds the CAP range. The Barraud case reflects a number of bucket fragments which were identified. The low showing for the Tucker and Peyton Randolph deposits may represent a more restricted kind of waste disposal or may be a result of research error (i.e. identification of metal tool parts not made at the time of inventory).

Benson's (1978) idea was that South's patterns might reflect the degree of ties with a market and that fewer ties would be revealed by a greater similarity to the FAP. One might conclude from this comparison that the Tucker material conforms to Benson's theory. It is more like the FAP than the other two sites having the lowest kitchen mean, the highest architecture mean and a high arms mean. This may well be the case, but it is not the only explanation. One also has to remember that the Tucker material has a high clothing and reasonable furniture mean, higher than that expected for the FAP.

Brown et al. (1991) examined a number of sites including the entire Tucker assemblage (both pre and post Tucker deposits) using South's pattern recognition. Their results are depicted in Figure 3.2. If one uses the entire Tucker assemblage the outcome is changed somewhat, showing Tucker's architecture group mean lower relative to the others and the

FIGURE 3.2

RESULTS OF BROWN ET AL. SOUTH'S PATTERN RECOGNITION APPLICATION



(Brown et al. 1991:5.12 Figure 5.4)

kitchen group mean more comparable to the others. Thus it would seem that all three sites enjoy roughly equal ties to the market as they are all roughly similar to the CAP. Yet Brown et al. take another perspective, concluding that the higher means in the personal, clothing, furniture and arms groups is a result of the "...greater overall diversity of the assemblage, which is partially a result of location, and the fact that many of these materials were sealed under interior floors and so were better preserved" (1991:5.11). In the Figure 3.1 depiction of the data it could also be said that the higher means in the architecture, furniture, arms and clothing groups are reflective of a greater diversity of the assemblage.

Yet, if a closer look is taken at the class level as shown in Table 3.3, one might not reach the same conclusion. The diversity of Tucker material versus Barraud and Peyton Randolph is undeniable in the arms group, but the quantity of clothing-related material from Tucker only includes one more class of artifact than found at Peyton Randolph. The architecture group for both Tucker and Peyton Randolph includes four classes and three in the case of Barraud. Since the furniture group is made up of only one class, an even closer look would be required to assess the true diversity. The personal group shows two classes represented by the Peyton Randolph material and only one by Tucker and Barraud. As with the furniture hardware class it may be helpful to further

examine the personal items class to truly reveal the range of diversity represented. When an examination of the groups not dominated by the Tucker material is made, it is seen that in the kitchen group the classes of tableware and kitchenware are not represented in the Tucker material as they are in the other two sites. The activities group has Peyton Randolph representing seven classes to Tucker's five and Barraud's three. It is reasonable to conclude that South's classification system at the group level is not ideal to evaluate the true range of an assemblage. This classification system accentuates some features of an assemblage and masks others and cannot be adequately evaluated at the group level without careful consideration of the classes, materials, wares and types that contribute to the final quantification.

The main point here is that a couple of glass beads, slate pencils, gunflints and lead shot do not prove that Bermuda held a different position in the international economy or that the assemblage is truly reflecting greater diversity. Although the occurrence of these items affects the artifact profile, the final effect may not be as significant as it appears. The Benson type comparison suggested the possibility that Bermuda, being most similar to the FAP, had reduced ties to the market (or perhaps just different ties to the market) compared to Williamsburg. A more detailed examination of the Brown et al. view of the data does not fully support the conclusion that the Tucker material exhibits a greater overall

diversity. One of these observations may indeed be true, but the Southian quantification of the data at the group level does not allow for any substantial conclusions about the material. As stated by Brown et al. (1991), the differences of the Tucker material to Barraud and Peyton Randolph in this kind of quantification could have something to do with the interior location of the Tucker material. We may also be seeing a reflection of different priorities in the community (e.g. the need to arm the home), or a unique refuse pattern. Just because there are no tablewares represented in the Tucker assemblage, we cannot assume that the occupants ate with their hands, and, by the same token, a lack of arms-related material at the Barraud and Peyton Randolph sites does not mean they had no arms. Ultimately, further testing of the material is necessary.

Thus South's quantification system using his groups and classes has proved to be too general for a study of the international economy at the global scale of comparison. This is not particularly surprising as trade involves specific commodities, and it is likely that in a more detailed quantification the artifacts will produce the best results and be better suited to answer questions of what got where, why and how. Nevertheless, South's method of quantification is not to be abandoned. As mentioned in the previous section, there are many problems with the classification system itself, mainly that not all the categories within the levels of the

system are equal. South (1977:96) himself admits that all of his groups are not equally comparable and this is true of a number of the other levels of his classification system as well. In addition, the form-based, but somewhat functionally influenced, nature of the system means that a number of artifacts technically relate to more than the single group to which they are assigned and this can skew an interpretation. All this relates back to observations made by Warfel (1982) and Stevenson (1983) that the classification system helped create South's patterns and that new classification systems must be designed to address the research questions. Certainly, through creative application there is a future for South's approach to pattern recognition.

MILLER'S STATUS INDEXING

In 1980 Miller presented a method of economic scaling of ceramics based on documentary records from the English ceramic industry of the late eighteenth and through the nineteenth centuries. The index values developed by Miller are all relative to the cost of the very consistently priced cream coloured ware (CC), and the values are set up according to date, ware/decoration type and form, see Table 3.4 for an example. The values are calculated by vessel form where the sum of the indices identified are divided by the number of vessels used.

The majority of problems with Miller's proposal for

TABLE 3.4

AN EXAMPLE OF MILLER'S INDEX TABLES

CC INDEX VALUES FOR SHELL EDGE WARES

	Dishes			Plates	Twifflers		Muffins	
	14	12	10	10–9	8	7	6	5
1787	1.5	2.0	2.0	1.67	2.0	2.11		
1793				1.35				
1796	1.67	1.5	1.5	1.33	1.28	1.33	1.41	
1802	1.6	1.58	1.67	1.38	1.23	1.4		
1804	1.5	1.25	1.25	1.33	1.5	1.51	1.49	
1814	1.64	1.57	1.2	1.33	1.28	1.33	1.41	1.24
1816	1.64	1.57	1.2	1.43	1.32	1.28	1.33	1.41
1821	1.64	1.57	1.2	1.33	1.28	1.33	1.49	1.24
1823	1.64	1.43	1.2	1.33	1.28	1.4	1.41	1.49
1825	1.64	1.57	1.2	1.33	1.28	1.33	1.41	1.5
1833	1.64	1.57	1.64	1.33	1.43	1.33	1.4	1.5
1836				1.33	1.25	1.38	1.45	1.25
1838	1.64	1.57	1.2	1.33	1.29	1.33	1.4	1.25
1846	1.64	1.57	1.2	1.14	1.13	1.14	1.17	1.2
1848		1.57	1.2	1.33	1.28	1.33	1.41	
1853	1.64	1.57	1.2	1.12	1.11	1.13	1.16	1.2
1859	1.13	1.05	1.09	1.09	1.05	1.06	1.07	1.09
1866	1.13	1.1	1.08	1.12	1.11	1.13	1.15	1.2
1869	1.13	1.1	1.08	1.14	1.11	1.13	1.15	1.2
1870	1.1	1.08	1.13	1.07	1.08	1.1	1.09	1.12
1871	1.13	1.1	1.08	1.08	1.11	1.12	1.25	1.3
1874				1.09	1.10	1.11	1.14	1.18
1880				1.09	1.1	1.12	1.14	1.18

UNDERGLAZE LINED WARES

	Dishes			Plates	Twifflers		Muffins	
	14	12	10	10–9	8	7	6	5
1814	2.18	2.0	1.6	1.67	1.71	1.68	1.81	2.0
1816	2.18	2.0	1.6	1.43	1.5	1.43	1.5	1.6
1823	2.18	2.0	1.6	1.67	1.71	1.8	1.81	1.99
1825	1.82	1.71	1.4	1.5	1.5	1.5	1.61	1.75
1833	2.18	2.0	1.6	1.67	1.71	1.67	1.8	2.0

BAND-AND-LINE WARES

	Dishes			Plates	Twifflers		Muffins	
	14	12	10	10–9	8	7	6	5
1873	1.27	1.43	1.2	1.2	1.29	1.22	1.32	1.2
1886	1.22	1.33	1.13	1.13	1.17	1.2	1.25	1.18

(Miller 1991:12)

economic scaling are identified by Miller himself. These include the gaps in the index lists, the poor accommodation for ceramic material at the very bottom and top of the scale (i.e. coarse earthenwares and stonewares and highly priced material), and variables like breakage and resale which affect a ceramic assemblage (Miller 1980). Some of these problems were addressed and reduced in Miller's 1991 publication of revised index values, although coarsewares remain a problem. Miller also discussed the importance of temporal control and compatibility of comparison; "...CC index values from one period should not be compared to those from another period without taking into consideration the declining prices and changing tariff rates" (1991:3). To aid the researcher Miller provided a grouping of indices that are comparable.

Somewhat similar to the temporal issue is the one pertaining to the comparison of assemblages from different economic markets. Miller's indices are based on wholesale values, not retail values, and because of this, the comparison of assemblages from different markets introduces the variable of retail cost. An inter-market comparison necessitates the assumption that 'X' number of dollars buys the same amount of ceramic in both places and should this not be the case, the comparison is invalid. Certainly this problem could be corrected if a comparison was made of the retail cost of ceramics in the two places.

On the other hand, this problem could prove an advantage

if the research goal was redefined. Consider the possibilities. If the constant was the economic scale rather than the market, two assemblages representing the same socioeconomic status from different market spheres compared according to Miller's indexing system, the result might reflect the goods available for purchase. Certainly, if the assemblages compared represented a high level of affluence in their communities, the expectation would be that their range of ceramics would be a selection of the best that was available. Thus for the comparison of St. George's and Williamsburg material, it would be anticipated that one or the other would have a higher Miller index value as they are believed to occupy different positions in the international economic hierarchy.

MILLER'S STATUS INDEXING: APPLICATION AND INTERPRETATION

The results of the Miller status indexing analysis are shown in Table 3.5. There are problems with the results. The mean ceramic date for the Peyton Randolph material was more recent than the material could possibly be, as indicated by the presence of the pearlware and whiteware and the quantity of creamware in the assemblage. The fact that the Peyton Randolph deposit is secondary fill has probably allowed for some mixing of material resulting in the skewed date.

Table 3.6 shows the calculation of the mean ceramic dates for the three sites. The presence of creamware, pearlware and

TABLE 3.5

MILLER'S INDEX VALUES FOR BARRAUD, TUCKER AND PEYTON RANDOLPH

	BARRAUD	TUCKER	PEYTON RANDOLPH
Plates	1.203	2.077	1.000
Bowls	1.474	1.964	1.000
Saucers	2.250	2.426	1.000
Cups	2.600	2.770	1.000

TABLE 3.6

MEAN CERAMIC DATE CALCULATIONS

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	Ceramic Type	Sub-Type	Date Range	Median			Barraud				Randolph				Tester		
1	Ceramic Type	Sub-Type	Date Range	Median			Barraud				Randolph				Tester		
2	Porcelain						Median	Fragments	Product		Median	Fragments	Product		Median	Fragments	Product
3		Canton	1800-1830	1815													
4		Over-glazed China trade	1790-1825	1808													
5		Over-glzd Enamel Export	1660-1800	1730			1730	19	32870		1730	78	134940		1730	15	25950
6		English	1745-1795	1770							1770	4	7080				
7		Under-glzd late Ming	1574-1644	1609													
8		Under-glzd Blue	1660-1800	1730			1720	44	76120		1730	165	285450		1730	14	24220
9																	
10	Stonewares																
11		Brown, ink, beer	1820-1900	1860													
12		Nottingham	1700-1810	1755							1755	1	1755		1755	1	1755
13		Buralem	1700-1775	1738													
14		Fulham	1690-1775	1733			1733	7	12131		1733	90	155970		1733	31	53723
15		Rhenish	1640-1680	1670													
16		Westerwald (Blue Floral)	1700-1775	1738							1738	20	34760		1738	3	5214
17		Sprig molded	1650-1725	1688													
18		Horn grey	1690-1710	1700													
19		Chamber pots	1700-1775	1738													
20		Moulded WSG	1740-1765	1753							1753	17	29801				
21		Debased Scratch Blue	1765-1795	1780			1780	1	1780		1780	5	8900				
22		Scratch Blue	1744-1774	1760			1760	1	1760						1760	1	1760
23		Transfer-printed WSG	1756-1765	1760													
24		WSG	1720-1806	1763			1763	3	5289		1763	165	290895		1763	10	17630
25		Littler's Blue	1760-1765	1758							1758	1	1758				
26		WSG plates	1740-1775	1758													
27		Slip-dipped WSG	1715-1775	1745													
28		Trailed WSG	1720-1730	1725													
29		Ironstone	1813-1900	1857			1857	1	1857								
30		Black Basalte	1760-1820	1786			1785	1	1785								
31		Eng-trnd unglzd red	1763-1775	1769													
32		Ref. red S.W., unglzd, sprig	1690-1775	1733													
33		Ralph Shaw	1732-1750	1741													
34																	
35	Earthenwares																
36		Combed yellow slipware	1670-1795	1733							1733	81	140373		1733	5	8665
37		N. Devon Sgraffito	1650-1710	1680													
38		Wrotham slipware	1612-1700	1656													
39		Metropolitan Slipware	1630-1660	1645													
40		N. Italian Marbelized	1610-1660	1635													
41		Yorktown	1720-1745	1733							1733	59	102247		1733	1	1733
42		Whiteware	1820-1900	1860			1860	1	1860		1860	1	1860		1860	22	40920
43		Mocha	1795-1890	1843													
44		Jackfield	1740-1780	1760							1760	1	1760		1760	3	5280
45		Green Glzd. Cream body	1759-1775	1767													
46		Clouded	1740-1770	1755													
47		Ref. Agate	1740-1775	1758													
48		Astbury	1725-1750	1738											1738	1	1738
49		Lusterware	1790-1840	1815											1815	2	3630
50		Coarse agateware	1750-1810	1780													
51		Iberian	1745-1780	1763							1763	3	5289				
52		Buckley	1720-1775	1748							1748	2	3496				
53		N. Devon gravel	1650-1775	1713							1713	7	11991				
54		dobase Rouen faience	1775-1800	1788													
55		Red Foot delft Ointment	1730-1830	1790													
56		Evert Rim delft Oint	1700-1800	1750													
57		17th Century Sites delft	1600-1802	1650													
58		18th Century Sites delft		1750			1750	3	5250		1750	343	600250		1750	38	66500
59		Plain delft wash basins	1750-1800	1775													
60		Mimosa delft	1710-1740	1725													
61		Eng. delft blue-dot chgr	1620-1720	1670													
62		Cylin delft ointment	1630-1700	1665													
63		Plain white delft	1640-1800	1720											1720	21	36120
64		Monochrome delft apoth	1620-1775	1698													
65		Poly delft apoth	1590-1640	1610													
66		Delft chamber pots	1660-1800	1730													
67		Wheildon	1740-1770	1755							1755	13	22815				
68	Creamware																
69		Finger-painted poly slip	1790-1820	1806													
70		Annular	1780-1815	1798											1798	9	16182
71		Light yellow	1775-1820	1798													
72		Overglzd. Hand Painted	1765-1810	1788							1788	1	1788		1788	1	1788
73		Creamware	1762-1820	1791			1791	98	175518		1791	565	1011915		1791	97	173727
74		Transfer Printed	1765-1815	1790													
75		Deep Yellow	1762-1780	1771													
76		Littler's Blue	1760-1765	1763													
77																	
78	Pearlware																
79		Under-glzd. poly	1820-1840	1830													
80		Mocha	1795-1890	1843			1843	1	1843								
81		Finger-Painted	1790-1820	1806													
82		Embossed feathers, fish	1800-1820	1810													
83		Willow	1795-1840	1818													
84		Transfer-printed	1795-1840	1818			1818	2	3636		1818	2	3636		1818	66	119988
85		Underglzd. Poly	1795-1815	1805			1805	3	5415						1805	1	1805
86		Annular	1790-1820	1800			1800	1	1800		1800	6	10800		1800	4	7200
87		Blue/Green edged	1780-1830	1805			1805	7	12635		1805	3	5415		1805	4	7220
88		Undecorated	1780-1830	1805			1805	24	43320		1805	30	54150		1805	31	55955
89		Painted Blue underglz	1779-1820	1800			1800	3	5400		1800	15	27000		1800	30	54000
90								220	396269			1684	2966626			411	732708
91																	
92																	
93							MCD:	1773.95			MCD:	1761.65			MCD:	1782.73	
94																	
95						Slider:	90.17			Slider:	33.26			Slider:	36.66		
96																	
97																	

Mean Ceramic Date Formula, after South 1977

a small quantity of whiteware suggests that the deposits shared a common time period. However, it looks like the Peyton Randolph deposit reflects a longer period, starting earlier, than that of the other two sites. This is based on the higher occurrence of earlier wares in the Peyton Randolph deposit including white salt-glaze stonewares, Wheildon type wares and slipwares. The presence of creamware and pearlwares at all sites secures a date some time in the later part of the eighteenth century or later, as it is expected that there is some time lag before such wares would discarded. The higher quantities of pearlware in the Barraud and especially the Tucker assemblages suggest that the deposits were open longer than the Peyton Randolph deposit. The time frame of the late eighteenth to the early nineteenth centuries that we have been using is reasonable. Unfortunately, because there were significant developments in the ceramic industry during that period, namely the introduction of pearlware, the comparison of these three deposits will without a doubt be affected, and this will have to be taken into consideration in the interpretations.

With the problem with the mean ceramic dates expressed, the trouble of the ceramic indices remains. Unfortunately, as mentioned in the review of Miller's method, the indices are not complete, especially for the late eighteenth century. This is a problem because these are the indices needed to make the comparison between the Barraud, Tucker and Peyton Randolph

material. The compromise made was to use the 1787 indices. If not available, the next year given will be used, up to 1814 after which the indices are less comparable (Miller 1991).

In the results of the Miller analysis, shown in Table 3.5, the Tucker site demonstrates the highest index for plates, bowls and teas, followed by the Barraud material on all three counts. The Peyton Randolph site displays the lowest index possible. If Miller's indexing system can be used to evaluate the goods available in a market, as outlined in the previous section, there was a greater quality of ceramic wares available in St. George's, Bermuda than in Williamsburg, Virginia (Table 3.5).

However, if we take a closer look at the assemblages and specifically the porcelain, which could not be included in the Miller analysis, a different picture emerges. Table 3.7 lists the identified vessels of Chinese porcelain found at each of the three sites, and it is clear that the Peyton Randolph deposit displays a wide range of vessel forms and a range of decoration types comparable to the other two sites. Thus it is difficult to conclude that the Miller index for the Peyton Randolph material is truly representative of what was available in Williamsburg. Certainly the Miller index result for the Peyton Randolph material is limited by the inability to fully include high-range ceramics in the calculation. The comparison is also biased by the smaller proportion of pearlware in the Peyton Randolph sample which is thought to

TABLE 3.7

THE DISTRIBUTION OF CHINESE PORCELAIN
TEA WARES AND FOR ALL VESSELS

BARRAUD	TUCKER	PEYTON RANDOLPH
cups:	cups:	cups:
overglaze black	overglaze red	plain
overglaze red	overglaze poly	plain
overglaze red	w/h overglaze poly	underglaze blue
underglaze blue	underglaze blue, Batavian	underglaze blue
	overglaze red, Batavian	
saucers:	saucers:	saucers:
overglaze red	overglaze red	underglaze blue
overlgaze poly	overglaze red	
	overglaze red & gold	
	underglaze blue	
	underglaze blue	
	underglaze blue	
	underglaze blue, Batavian	
	overglaze poly	
	overglaze poly	

	B	T	PR
Chinese Porcelain:			
plate, underglaze blue	7	1	8
plate, painted polychrome			2
soup plate, underglaze blue	3		
platter, underglaze blue	2		1
shallow bowl, underglaze blue	2		
large bowl, painted over	1		
bowl, painted under			1
cup w/ handle, painted over polychrome		1	
cup w/o handle, underglaze blue	1		2
cup w/o handle, plain			2
cup w/o handle, painted over	3	1	
cup w/o handle, painted over polychrome		1	
cup w/o handle, Batavian underglaze blue		1	
cup w/o handle, Batavian painted over		1	
saucer, painted over	1	2	
saucer, painted over polychrome	1	1	
saucer, painted over red and gilt		1	
saucer, painted under		3	1
saucer, Batavian underglaze blue		1	
small tureen, underglaze blue	1		
oval tureen lid, painted over	1		
pitcher, painted under			1
lidded vessel			1
can, painted under			1

be the result of the deposit having been closed earlier than the Tucker or Barraud deposits.

So far the value of the application of Miller's index values has been limited, in part due to the index values available and partly due to the nature of the assemblages being compared. Perhaps an examination of the teawares alone will shed light on the goods available in Williamsburg and St. George's. Tea wares hold a unique position in the ceramic assemblage of a household in the eighteenth century. Beaudry states that "Although the rich could easily afford the fashionable and prestigious wares, what is most apparent is that the social significance of tea-drinking caused those other than the very wealthy to strive towards this ideal" (1978:204). Thus we would expect the tea wares from the three sites to reflect the best that was available to high-status consumers in Williamsburg and St. George's. The results of the Miller analysis in Table 3.5 conform to this where tea wares demonstrate the highest index value in the Barraud and Tucker sites series. The tea ware values between Barraud and Tucker are similar, with a difference of only 0.16. Based on this alone one could conclude that the available ceramics in St. George's and Williamsburg were at least comparable. To this we can add the information in Table 3.7 about the Chinese porcelain tea ware. There is the suggestion of tea sets in all three deposits: overglazed red Chinese porcelain (2 cups and 1 saucer) for Barraud, Batavian (1 cup and 1 saucer) and

overglaze red Chinese porcelain (1 cup and 1 saucer) for Tucker, and plain Chinese porcelain (2 cups) and underglaze blue Chinese porcelain (2 cups and 1 saucer) for Peyton Randolph. In addition to these sets there are a range of other decoration types found in the Barraud and Tucker deposits, the Tucker deposit having the widest range of decoration types. This seems to suggest that the residents of St. George's had access to a finer range of high quality tea wares than those people living in Williamsburg. This is quite possible, yet when a comparison is made of the range of Chinese porcelain vessel forms found in each deposit, both the Barraud and Peyton Randolph deposits show a wider range of forms including pitchers, tureens, platters and bowls. Except for the tea wares the only additional vessel in the Tucker deposit is a plate. Thus while residents of St. George's had access to higher quality tea wares, Williamsburg residents had access to a wider range of Chinese porcelain vessel forms. This points to different access to Chinese porcelain by St. George's and Williamsburg. What this may correspond to is that Americans and Europeans enjoyed different aspects of Chinese porcelain. Fischell states that "During the nineteenth century, Americans desired porcelain as much as had Europeans before them. But vases, punch bowls, and prunus-decorated ginger jars were never as popular as the almost endless number of cups, teapots, plates, platters, bowls, and saucers that crossed the oceans to Eastern seacoast ports"

(1987:72). Perhaps what we are seeing here in the difference between Williamsburg and St. George's is the beginning of this American desire.

The problem of sample size has been discussed already. It will suffice to say that it is possible that sample size has affected the results of the Miller analysis. Sample size has probably only influenced the comparison between Barraud and Tucker as the Peyton Randolph deposit problems were temporal. Although the Barraud and Tucker deposits are comparable, the results would be sounder if the Barraud sample were larger.

In spite of the biases which may have added to the wide contrast between the values, the results of the Miller analysis shows that the inhabitants of St. George's were not destitute. It suggests that what was available in Bermuda was at least comparable to what was available in Williamsburg. This conclusion is both supported and enhanced by the comparison of the Chinese porcelain which suggests that the two towns had different kinds of access to goods, but not necessarily an unequal access. The above application of Miller's index values shows that there is potential for the use of his status analysis in the evaluation of ceramics available to a community. It is necessary, however, to include the ceramics neglected in Miller's tables in the interpretation of the results.

ZIERDEN/GRIMES STATUS MEASURES

In their 1989 site report of the John Rutledge House, Zierden and Grimes discuss socioeconomic status. They feel that status can be evaluated in four ways from the archaeological record: "patterns of material culture, diet, housing, and site location" (1989:94). In recent years, the focus regarding status evaluation has expanded to include more than the measuring of ceramics as introduced by Miller (1980). An example of this is Ackermann's (1991) Economic Means Index derived from the amount of land, labour and animals owned by an individual. Faunal material has been used to evaluate status in a variety of ways including the value of different kinds and cuts of meat (Miller 1979), the occurrence of various types of fish (Singer 1987) and even in combination with probate inventories (Bowen 1978). In spite of this, ceramics continue to be a commonly used material in the evaluation of socioeconomic status and Zierden and Grimes continue with this tradition.

Zierden and Grimes have developed an artifact comparison that is a cross between South's (1977) classification system and Wise's (1976) economic scaling index. In addition to ceramics they include glass and South's architecture, clothing, personal and furniture groups. The result of the analysis is four percentage values with which to evaluate status: the porcelain and transfer printed wares as a percentage of the total ceramics; the table glass as a

percentage of the kitchen group; the architecture group percentage; and the sum of the clothing, personal and furniture group percentages.

Porcelain is considered a good high-status indicator for the eighteenth century when it was expensive and imported in limited quantities. Transfer-printed wares are good high-status indicators for the nineteenth century when matched sets were the coveted tableware item (Zierden and Grimes 1989). The expectation is that higher-status households will have a larger percentage of porcelain and transfer printed wares in their ceramic assemblage. This also means that the temporal discrepancy between the Peyton Randolph and the Tucker and Barraud deposits, which caused problems in the Miller analysis, is not a factor in this kind of analysis. Table glass is also thought to be a good high-status indicator until the nineteenth century when glass production increased (Zierden and Grimes 1989:96). The architecture group comparison is believed to reveal more substantial and improved housing in the higher-status groups and the clothing/personal/furniture percentage is thought to indicate a increased indulgence in luxury items. The interpretation of these four status-indicators is done in conjunction with the actual artifacts that make up the percentages.

It seems logical that the percentages would increase with socioeconomic status, and Zierden and Grimes (1989) found that these status-indicators reflected high, middle and low status

as expected for the assemblages from Charleston, South Carolina.

Like Miller's status indexing, Zierden's and Grimes's approach necessitates the comparison of assemblages from the same local economy to give valid results in this application. As with Miller's method of analysis, it is expected that a comparison of assemblages from the same socioeconomic status but from different local economies will reflect the goods available.

ZIERDEN/GRIMES STATUS MEASURES: APPLICATION AND INTERPRETATION

The tabulation of the Zierden and Grimes status indicators is given in Table 3.8. Here Tucker comes out ahead of the Barraud and Peyton Randolph deposits in all four fields. As in the interpretation of the Southian quantification, it must be noted that the high clothing/personal/furniture (CPF) rating is due in large part to a quantity of straight pins found at Tucker which may relate directly to the indoor nature of the deposit and a smaller screen size used during the excavation. The high architecture rating may also be related to the location of the deposit and may be due to the construction of floors, increasing the number of nails. If the percentage of nails to window glass is adjusted to reflect the ratio exhibited by Peyton Randolph, the architecture indicator is more comparable to the Peyton Randolph value. However, for most of the sites

TABLE 3.8

RESULTS OF THE ZIERDEN AND GRIMES STATUS INDICATORS

	porcelain/ transfer printed	table glass	architecture	clothing personal furniture
BARRAUD	26.838%	1.19%	22.5%	0.4%
TUCKER	27.632%	11.29%	29.4%	10.7%
PEYTON RANDOLPH	17.447%	5.53%	26.13%	1.062%

NOTE - The porcelain/transfer printed indicator is a percentage of all the ceramics. The table glass indicator is a percentage of the kitchen group. The architecture indicator is a percentage of the assemblage. The clothing/personal/ furniture indicator is a percentage of the assemblage.

used to develop the CAP the amount of nails was greater than the amount of window glass, so perhaps it is the Peyton Randolph deposit that is low rather than the Tucker deposit being high. Ultimately, it is difficult to put much stock into the architecture and CPF indicators as the nature of the Tucker deposit may correlate to the higher rating and because there may be other contributing factors including different kinds of architecture in Bermuda and Virginia.

Turning to the ceramic and glass indicators the Tucker deposits are ahead in the porcelain/transfer print value and well ahead with the table glass indicator. If the nature of a local economy is reflected in an assemblage at the household level, then it would seem that St. George's was not lacking for a supply of table glass and fine ceramics. The Barraud deposit also has a high porcelain/transfer print indicator suggesting that Williamsburg was equally well supplied. Barraud has a lower table glass value. This is somewhat countered by Peyton Randolph's higher table glass value which suggests that, although lower than Bermuda's value, the table glass goods available in Williamsburg are somewhat comparable to those in St. George's.

The comparison is expanded in Table 3.9 to include the values of some elite and middle class sites in Charleston, South Carolina, which as a port is believed to have had good access to goods (Zierden and Grimes 1991:9). Here one can see that similar glass and ceramic goods were available at all

TABLE 3.9

RESULTS OF THE ZIERDEN AND GRIMES STATUS INDICATORS WITH CHARLESTON DATA

	porcelain/ transfer printed	table glass	architecture	clothing personal furniture
BARRAUD	26.838%	1.19%	22.5%	0.4%
TUCKER	27.632%	11.29%	29.4%	10.7%
PEYTON RANDOLPH	17.447%	5.53%	26.13%	1.062%
CHARLESTON DATA:				
UPPER STATUS	21.97%	2.32%	36.0%	1.36%
MIDDLE STATUS	18.8%	0.69%	67.47%	1.09%

NOTE - The porcelain/transfer printed indicator is a percentage of all the ceramics. The table glass indicator is a percentage of the kitchen group. The architecture indicator is a percentage of the assemblage. The clothing/personal/ furniture indicator is a percentage of the assemblage.

three locations.

SUMMARY

This chapter has examined the potential of alternate applications of three standard tools of analysis. The goal was to use the methods of South, Miller and Zierden and Grimes to learn about the positions of St. George's, Bermuda and Williamsburg, Virginia in the international economic hierarchy. The three applications had varying degrees of success. South's pattern recognition was found to be too general for this purpose, but it was concluded that if the classification system were redesigned to address specific problems, the system could be more useful. Miller's status indexing was more useful for our purpose especially when interpreted in conjunction with those ceramics not represented in the tables. The majority of the problems with the Miller analysis were a result of the biases inherent in the three deposits. The Zierden and Grimes approach was the most useful because it evaluates both ceramics and glass and because it compensates for the temporal bias problem between the deposits.

The future for the alternative applications of standard tools in historical archaeology is full of potential. Some methods of analysis will need more redesigning than others to address additional research questions but the only real requirement is a creative imagination.

The Tucker, Barraud and Peyton Randolph material as analyzed using the methods of Miller and Zierden and Grimes suggests that St. George's, Bermuda had access to significant goods. In the interpretation of the Miller data a possibility of some kind of differential, but not necessarily unequal access was discovered based on the Chinese porcelain. The conclusion at this point is that the goods available to residents of St. George's Bermuda and Williamsburg, Virginia were similar.

CHAPTER 4

THE MEASURE OF DIVERSITY

INTRODUCTION

Since the 1960s, and the movement towards more scientific analysis in the quantification of archaeological material, many approaches to the interpretation of assemblages have been developed. In addition to designing methods specifically for archaeology, researchers also borrow and adapt techniques from other disciplines, such as diversity, taken from ecology.

Measuring diversity is a form of artifact distribution analysis. As Jones and Leonard (1989:1) state, it is "...how quantities of artifacts are distributed among classes."

This chapter will explain the fundamental concepts involved in the quantification of assemblage diversity. This involves the development of a classification scheme and the measurement of one or a combination of the three basic components of diversity: richness, evenness and heterogeneity. It will become clear just how flexible diversity measures are. A discussion of some of the previous applications of the approach in historical archaeology will follow. The chapter will conclude with an outline of the diversity measures to be applied to the St. George's and Williamsburg material.

THE FUNDAMENTAL COMPONENTS OF DIVERSITY

Diversity is a quantitative method of analysis. Therefore, it requires two major components: a way to divide up the data and a way to measure what has been divided up in mathematical terms. The former is a classification scheme which must be designed to address the research question. The latter are single values which reflect the three components of diversity.

The three fundamental components of the diversity concepts are richness, evenness and heterogeneity. There are a variety of formulae used to calculate richness, evenness and heterogeneity. Several have been presented by Bobrowsky and Ball (1989). The diversity measures and formulae chosen will depend on the research questions and the nature of the data.

In archaeology, richness is the number of classes in an assemblage. The more classes represented, the richer the sample. To measure the richness of a faunal sample one would use the range of species identified. In the study of ceramics, richness can be measured by vessel form, body type, decoration or a combination of these.

Evenness refers to the distribution of individuals over the classes. Uniformity in the distribution represents a high evenness. The way individuals are assigned to the classes will affect the evenness. For a faunal assemblage the minimum number of individuals might be used. In a ceramic study the minimum number of vessels or sherds could form the criteria.

Heterogeneity is the component that combines both richness and evenness into a single value. Bobrowsky and Ball (1989), in their discussion on diversity, argue against the use of the heterogeneity measure in archaeology as it masks the uniqueness of each component. This is an important point, and it is recommended here that the heterogeneity measure, if used at all, should only be interpreted in conjunction with the individual richness and evenness measures.

In order to measure richness, evenness and heterogeneity of a sample a classification scheme must be developed. This is an important part of the process because the type of classification scheme designed will depend on the research question. This flexibility is a major advantage of the diversity measure, but it can also be a source of problems. First, it is important for the classification system to be clear and plain. Second, all the classes in the system must be equal and individuals (or artifacts) only assigned once. Finally, all the classes must be different (Bobrowsky and Ball 1989:11).

Once the index values for the data have been calculated according to the classification scheme, they can be depicted graphically and explained. There are variables requiring considered in the interpretation of any sample (in this case an artifact assemblage). These are outlined by Bobrowsky and Ball (1989:11) and they include: sample size, nature of the classification scheme employed, the nature of artifact

retrieval, and research error. Some problems with sample size can be corrected by employing countermeasures (Kintigh 1989; Grayson 1984).

Keith Kintigh (1989) has developed a method to present the expected range of richness and evenness. This allows the interpretation of the data to accommodate the problem of sample size by comparing the index values in terms of their positions relative to the expectation and the confidence interval (Kintigh 1989:36).

Despite the fact that the basic components of diversity are simple, the means of applying them can get complex. The choice of which measures and formulae to employ will depend on the nature of the research question and the variables involved.

THE USE OF DIVERSITY IN HISTORICAL ARCHAEOLOGY

As with many methods of analysis in historical archaeology, diversity measures were first used by prehistorians (Dickens 1980; Rice 1981; Conkey 1980). Bobrowsky and Ball (1989) have summarized the major contributions of anthropologists and prehistorians to the study of diversity up to 1983 and a reiteration of their work is unnecessary. Since 1983 archaeologists have been more discriminating about their applications of diversity measures (Bobrowsky and Ball 1989:10), and the collection of research in *Quantifying Diversity in Archaeology* (Leonard and Jones

(1989) is an example of this. Studies by Nan Rothschild (1989) and Peter Bobrowsky (1985) using diversity measures in historical archaeology have been preliminary.

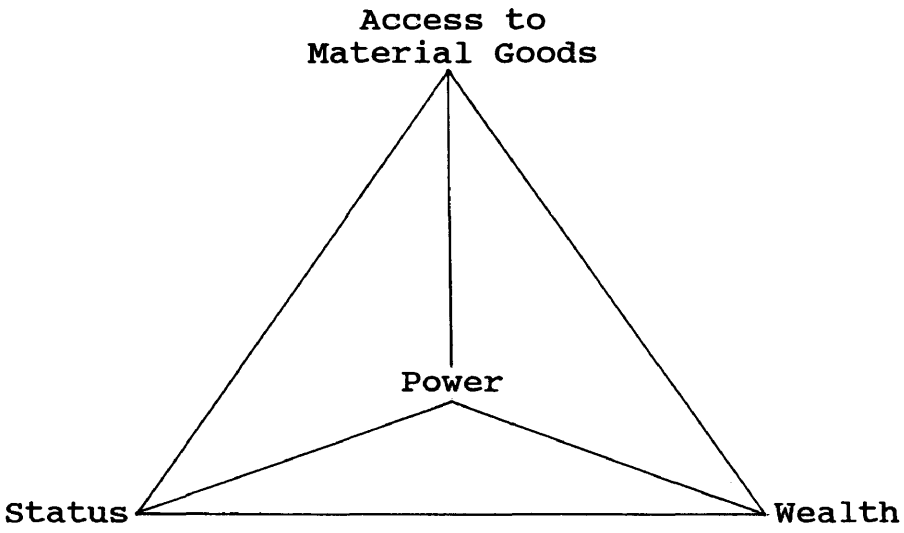
In a 1985 article Peter Bobrowsky discussed some of the variables involved in the study of status using archaeological material. He used diversity measures to evaluate status with the intention of overcoming some of the problematic variables. Bobrowsky hypothesised that the goods representing higher-status groups would exhibit greater variety (richness) and a less even proportion (evenness) than goods of lower-status groups. He based this on the idea that status is the result of economics and a model in the form of a tetrahedron where status, power and wealth pinnacle to reflect access to material goods (see Figure 4.1) (1985:393).

According to Bobrowsky (1985:393-4) the major problems encountered when comparing assemblages for differences between social groups are: unequal sample sizes; biased measurement or research error where variables are being improperly evaluated; preservational differences or the comparison of unlike classes of artifacts; and biased collection or incompatible retrieval methods and temporal and spatial characteristics. These are essentially the same problems recognized in the work of Bobrowsky and Ball (1989), discussed earlier in this chapter. Bobrowsky aimed to avoid the negative influence of these pitfalls in his analysis process.

Bobrowsky compared material from two buildings

FIGURE 4.1

BOBROWSKY'S TETRAHEDRON



representing high and low status from Fort George, Alberta. He employed a classification scheme that divided the assemblage into categories similar to those developed by South (1977) for his 'pattern recognition' scheme. Bobrowsky's categories were: hunting, trapping and defence; construction and hardware; business, household and personal items; and clothing and ornaments. The diversity measures were applied to the categories separately and all together.

Although the initial hypothesis was confirmed by the comparison and the expected house exhibited the higher richness, the explanation for the richness values of the individual categories was not so clear cut. Bobrowsky noted, for example, that the higher richness of the construction and hardware category in the high-status house was probably the result of it having been a larger house. Nevertheless, one might have expected the lower-status house to exhibit a higher richness in this category because the unskilled labourers that lived there were responsible for the construction work. Thus Bobrowsky concluded that there were more variables at work than status when an archaeological assemblage displays a high richness. He concluded that although there was a link between richness and status, there were other behaviours and activities represented in the richness of the samples. Because of this and his uncertainty regarding the significance of evenness, Bobrowsky did not attempt to interpret the evenness of his samples. He recommended that caution be used

in the study of status in archaeological assemblages because of the potential variables involved.

The limited success of Bobrowsky's attempt to measure status using quantitative diversity may be the result of an inappropriate classification scheme. As discussed earlier in this chapter, the classification scheme must address the research question. Thus, if the aim is to measure status, the artifacts in the assemblage studied must be good indicators of status. In this case, unless one can actually correlate richness in building hardware to status, there is no reason to apply diversity measures, as diversity in any one class of artifacts can reflect more than just status.

Nan Rothschild's 1989 application of diversity measures is more focused than that of Bobrowsky. She examined faunal material to answer questions about urbanization. Rothschild compared three deposits from New York City and three from St. Augustine, Florida dating from the sixteenth to eighteenth centuries. She expected the diversity of the food species to be relevant on two levels. First, socioeconomic differences should be discernable. Second, increasing urbanization would be parallelled by decreasing diversity as a result of factors like environmental change as well as an increased dependence on a market economy and food specialists like butchers (Rothschild 1989:93).

Rothschild (1989:93) considered the socioeconomic status of both assemblages constant as both were believed to

represent households from upper socioeconomic levels. Thus her study could focus on the nature of urbanization.

Rothschild employed two diversity measures which combined richness and evenness into a single value (heterogeneity) in an effort to test her urbanization hypothesis and to evaluate the usefulness of two different equations. The classification scheme was based on species and the minimum number of individuals assigned to each species. Rothschild chose not to include large domestic species because the existence of their remains in an assemblage did not represent a whole animal. It was expected that the St. Augustine material exhibit a greater diversity than that of New York because it was less urbanized. Its semi-tropical environment, assumed to be inhabited by a wide range of fauna, was another factor that was thought to maximize diversity. Yet she found that both formulae used pointed to the same conclusion: the New York City material was more diverse than that of St. Augustine.

Kintigh's (1989) technique for managing sample size problems was applied in combination with further analysis to isolate richness and evenness. Rothschild discovered that when richness and evenness were separated, more information was provided than with the single heterogeneity measure. In this case the richness factor supported the initial hypothesis, and the New York City deposits exhibited a gradual reduction in richness over time when sample size was taken into account. The St. Augustine material, when analyzed the

same way, showed the sixteenth-century deposit as having the least richness, while both eighteenth-century deposits had a high richness.

The results of the evenness calculations were remarkably similar to those of richness for the St. Augustine data while somewhat different for the New York City material. But, while richness displayed the number of species in a household diet its evenness "...is very suggestive of the degree of specialization in a food system, indicating whether most of the meat and fish eaten came from only a few species or from many, evenly apportioned taxa" (Rothschild 1989:97). When Rothschild included the proportion of domestic species to the diets of the households, she found that the addition of the domestic taxa did not alter the evenness of the St. Augustine samples. The sixteenth-century sample exhibited a low evenness while the other two deposits had a higher evenness. In spite of this, Rothschild (1989:98) concluded that "...it does not appear that there was a major change in the type of food system between the earlier and later time periods in terms of an economy heavily weighted towards these large, efficient food sources" (large domesticated animals). Her meaning becomes clearer considering that the MNI (sample size) from the deposits are 400, 128 and 173 from earliest to latest and that the same six species represent 67, 74 and 64 percent of these samples respectively. This shows how important it is not to interpret diversity indices in isolation.

In contrast, Rothschild found that the inclusion of the domestic species in the New York City samples significantly altered the evenness. While domestic food sources were important in the sixteenth and early nineteenth centuries, there was a significant decline in the consumption of them at the end of the period. Instead there was an increased dependency on birds and fish. The difference in evenness between the earliest and the latest deposit would be less if there was a way to include the domestic taxa in the classification scheme. Rothschild concluded that the later deposit depicts a more specialized and exotic diet than the earlier deposits. This could reflect sampling error or "...be a valid reflection of the food habits of at least some portion of the upper socioeconomic strata of society, during a period when these strata were becoming more differentiated" (Rothschild 1989:98).

Thus Rothschild's preliminary conclusions regarding the usefulness of the two diversity equations was that they were consistent in their results. With regard to her model of increasing urbanization, Rothschild found that the New York City deposits did conform to her expectation of a corresponding decrease in diversity. St. Augustine, however, did not conform to the model. There the earliest deposit was characterized by lower diversity than the later deposits. The use of domestic mammals was also different in the two areas. In St. Augustine the proportion of domestic animals increases

over time while in New York City it decreases. Rothschild (1989:98) concluded that more factors than urbanization, class and the system of production affect faunal diversity. More research must be done on these and other variables influencing faunal material.

One of the reasons Rothschild had more success with her preliminary application of diversity measures than Bobrowsky is the fact that her classification scheme was better suited to her research question than that of Bobrowsky. Rothschild was also more aware of the variables involved, like socioeconomic status and the nature of the deposits. She chose to work with parts of household deposits rather than whole deposits reflecting different activities. Rothschild's work confirmed the observation of Bobrowsky and Ball (1989) that the interpretation of richness and evenness individually provide more insight on the research question than the heterogeneity measure alone. In spite of the fact that Rothschild improved on the use of quantitative diversity in historical archaeology both she and Bobrowsky came to the same conclusion regarding its usefulness. Both suggested that study of more and larger samples and further exploration into the impact of variables must take place.

Both Bobrowsky's and Rothschild's studies were preliminary examinations illustrating the potential of the quantification of diversity. The importance of developing a classification scheme that directly relates to the research

question is evident. It is the main difference between Bobrowsky's (1985) unsuccessful attempt at measuring status and the success of Rothschild (1989) had with her study of urbanization. My thesis builds on both Rothschild's and Bobrowsky's studies but takes a greater number of variables into account. It is on a similar scale to that of Rothschild and it addresses many of the same topics such as inter-site comparisons, socioeconomic status and the development of classification schemes. While the socioeconomic status will be held constant, other factors, such as various levels of economic relations will be considered. The measurement of diversity is new to historical archaeology and without a doubt our research will only improve as we continue to use it and learn from its application.

MEASURING DIVERSITY IN BERMUDA AND VIRGINIA

In Chapter One the nature of this comparison of the glass and ceramic from Bermuda and Virginia was described. It was decided that richness and evenness were to be calculated in terms of point of origin and the range of quality of the wares. The point of origin is expected to quantify the range of trade connections while quality will depict the range of goods available. What remains to be decided are the formulae to be used in the calculation of the richness and evenness values. After careful consideration, the decision was made to employ the simplest measures. These measures have their

problems, but because the assemblages are to be evaluated using a number of classification systems, these variables and biases are regarded as being manageable.

Richness will be evaluated by direct species counts. Bobrowsky and Ball have criticized this approach as it disregards the problem of sample size which has been shown to directly affect richness (1989:5). This is a drawback, but as the material is to be quantified in so many ways, the biases relating to sample size will probably be revealed.

For measuring evenness Bobrowsky and Ball (1989) recommend Fager's (1972) approach. This is an equation calculating an index value based on the number of 'moves' of individuals (e.g. sherds) within the classification scheme required to achieve an even distribution. The full equation is given in Chapter Five. Although this approach, like that for measuring richness, is not without its biases (sample size and richness) it is expected that the series of quantification applications to the material will serve to reduce the possibility of error in the interpretation.

It would be ideal to use Kintigh's method for expected range, as described in the first section of this chapter, to counter some of the biases of samples size in this comparison. Unfortunately, this study has neither the scope nor the tools necessary to include Kintigh's counter measure. Instead, discrepancies in sample size will be carefully considered.

The measurement of richness and evenness will be

uncomplicated using a direct species count for the former, and Fager's method for the latter. These measures have some drawbacks, but careful consideration of biases throughout the analysis will minimize these problems.

THE CLASSIFICATION SCHEME

The richness and evenness of the point of origin and the range of quality of the glass and ceramic material from three sites is to be measured. Factors to consider in the development of this classification scheme include: sherd vs. vessel counts, function, vessel form, ware type, and level of trade network. The glass and ceramics will be analyzed separately. The salient components will then be combined according to the scheme that best reflects points of origin and quality of material. Much of the work is based on a preliminary proposal (Microys 1991).

Where possible, the assemblages will be quantified in both ways to provide a broader view of the data and to help to control the biases affecting the nature of the deposits. The Peyton Randolph deposit is secondary while the Barraud and Tucker deposits are primary.

The point of origin of the material will be attempted in three ways: by country, by continent, and by trade network level as defined by Adams (1976). A sample record sheet for these three types of analysis is shown in Figure 4.2. The aim

FIGURE 4.2

EXAMPLE FORM:

POINT OF ORIGIN - CERAMICS AND GLASS SITE:

BY COUNTRY:

vessel	sherd	country
_____	_____	Great Britain
_____	_____	United States of America
_____	_____	China
_____	_____	Holland
_____	_____	France
_____	_____	Germany
_____	_____	
_____	_____	
_____	_____	

BY CONTINENT:

vessel	sherd	continent
_____	_____	Asia
_____	_____	North America
_____	_____	Europe
_____	_____	

BY TRADE NETWORK LEVEL:

vessel	sherd	trade network level
_____	_____	local
_____	_____	local-commercial
_____	_____	area-commercial
_____	_____	regional
_____	_____	national
_____	_____	international

will be to evaluate both vessel and sherd counts in the three ways listed. It is anticipated that each method may not beof equal usefulness, especially in the classifications where the number of classes is small (no doubt the number applicable to the assemblages will be even smaller). It is also recognized that the level of accuracy achieved by Adams (1976) and Baugher-Perlin (1982) in their studies using the embossed maker's marks on glass bottles will not be matched in this study. Here the sherds will be attributed to their countries of origin in the most general of ways, which will be adequate considering the scale of the comparison. Finally, although it was initially thought (Microys 1991) possible and useful to quantify a combination of country of origin and vessel form, it is now apparent that the information to be gained from such an analysis can also be secured via vessel form for each location.

Measuring the range of quality is not nearly as straight forward. It involves considering how the range of quality of goods is reflected in glass and ceramics and if these two materials reflect it in the same way. Ceramics can be evaluated in terms of ware type and decoration. Although quality is often assessed by ware type, the more important aspect is the *range* of quality. In this way the classes identified all carry the same weight. For quantification of ceramic data by ware type and vessel, it may be beneficial to separate the table wares and the tea wares. Miller, Martin

and Dickinson have noted that "Consumers would have had a difficult time matching table and tea wares until the 1830s because of what was available in tea and table ware as well as a mind set that separated these wares" (1989:19). Tea wares were an especially public ware while table wares were more private. This functional difference makes the separation necessary to maintain the equal weight of individuals in the classification system.

It may also be possible to evaluate the range of quality in terms of vessel forms represented. The underlying idea is that a location occupying a higher position in the international economy will display a wider range of vessel forms. This may be related to ware type. The diversity of the ceramic material will be measured using both of these types of classification systems with their variations. See Figures 4.3 and 4.4 for the basic forms depicting these systems.

Although glass ware types are not as diverse as those of ceramics, they may shed light on the range of quality, especially in terms of decoration. For this reason the glass sherds and vessels will be measured. As with ceramics, vessel function of glass may also reflect the range of quality. It may be beneficial to analyze the glass vessels on two levels: the general function and the specific vessel form, i.e. drinking vessels versus shot glass, tumbler, goblet, etc. In this way, the various functions of glass ware can be explored

FIGURE 4.3

EXAMPLE FORM:

RANGE OF QUALITY - CERAMICS SITE:

BY WARE TYPE:

vessel sherd ware decoration type

FIGURE 4.4

EXAMPLE FORM:

RANGE OF QUALITY - CERAMICS SITE:

BY FORM:

_____ Plate
_____ Bowl

and the finer points of the diversity recognized. A form showing the skeleton of the various glass classification systems can be found in Figures 4.5 and 4.6.

The above completes the outline of the classification systems for the measurement of diversity of the Tucker, Peyton Randolph and Barraud assemblages. Chapter Five will demonstrate the application of the classification scheme and diversity measures. The aim is to test the hypothesis that if sites of the same socioeconomic status from distinct geographic locations occupy different positions in the international trade hierarchy, the positions held will be reflected in the material goods found in the locales. It will also serve to test the conclusion already arrived at in Chapter Three where the use of methods devised by South (1977), Miller (1980) and Zierden and Grimes (1989) showed that the goods available to residents of St. George's and Williamsburg were similar.

FIGURE 4.5

EXAMPLE FORM:

RANGE OF QUALITY - GLASS SITE:

BY WARE TYPE:

vessel	sherd	ware type
_____	_____	Green
_____	_____	Aqua
_____	_____	
_____	_____	
_____	_____	
_____	_____	
_____	_____	
_____	_____	
_____	_____	Coloured Glass Totals
_____	_____	
_____	_____	
_____	_____	
_____	_____	
_____	_____	
_____	_____	
_____	_____	
_____	_____	
_____	_____	Colourless Non-Leaded Glass Totals
_____	_____	
_____	_____	
_____	_____	
_____	_____	
_____	_____	
_____	_____	
_____	_____	
_____	_____	
_____	_____	Colourless Leaded Glass Totals

FIGURE 4.6

EXAMPLE FORM:

RANGE OF QUALITY - GLASS SITE:

BY FORM AND GENERAL FUNCTION:

Storage Vessels Total _____

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Pharmaceutical Vessels Total _____

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Table Glass Vessels Total _____

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

CHAPTER 5

MEASURING DIVERSITY: ST. GEORGE'S AND WILLIAMSBURG

INTRODUCTION

This chapter presents the application and interpretation of diversity measures to the material from the Barraud, Tucker and Peyton Randolph sites. There are two aims of this chapter:

1) to test the hypothesis is that if sites of the same socioeconomic status from distinct geographic locations occupy different positions in the international trade hierarchy, the positions held will be reflected in the material goods found in the locales. The richness and evenness of the glass and ceramics from the three sites will be quantified to test the hypothesis.

2) to test the usefulness of diversity measures in historical archaeology.

There are six sections in this chapter. The first section is a discussion of procedures used. The subsequent four sections present and interpret the data. The final section is a summary of the findings and a discussion of future applications of diversity measures. By the conclusion

of this chapter it will be clear that although St. George's, Bermuda and Williamsburg, Virginia occupied distinct positions in the international trade network, their access to glass and ceramic goods was similar. It will also be shown that diversity measures are a useful analytical tool in historical archaeology.

THE PROCEDURE

There are a number of decisions to be made. A classification scheme which addresses the research question must be designed when diversity measures are employed. A choice must be made on what to measure: richness, evenness and/or heterogeneity. The formulae used to measure these components must be chosen. Some of these things have been addressed in previous chapters. In Chapter One the decision was made to calculate richness and evenness in terms of point of origin and the range of quality of the wares. Chapter Four outlined the classification schemes to be employed (see Tables 4.2 through 4.6) and briefly described the way richness and evenness were to be measured.

Richness will be evaluated in terms of direct species counts. Evenness will be calculated using Fager's NM index where $NM = N(S + 1)/2 - \sum R_i n_i$ and then scaled using $(N - S)(S - 1)/2$ to arrive at the evenness value (Fager 1972). In the above: N = total individuals, S = total classes, R_i = rank of classes i and n_i = number of individual classes. Fager's index

is "based on the number of "moves" that would have to be made to convert an observed distribution of individuals among species into an even distribution" and was concluded to be a reasonable measure of evenness (Fager 1972:299).

The quantifications of the glass and ceramic material from the Barraud, Tucker and Peyton Randolph sites can be found in Appendix 1 (point of origin) and in tables in the text (ceramic and glass quality). The artifact inventory and vessel count lists for the three sites, provided by the Department of Archaeological Research of the Colonial Williamsburg Foundation, were the basis for the quantification. There is potential for researcher bias in the inventories and vessel counts as different individuals were involved on the three sites. The careful recording of material by Colonial Williamsburg's Department of Archaeological Research has without a doubt kept the effects of this to a minimum.

There were some problems with the quantification of the glass material because no minimum vessel count was done for the Peyton Randolph glass. A coarse minimum vessel count based on the inventory was not adequate, so the Peyton Randolph material could not be included in all the measures.

Once all the material was quantified on the forms in Appendix 1 additional tables and graphs were made to present the data. These are presented in the discussion sections that follow.

POINT OF ORIGIN: CERAMICS AND GLASS

The measure of the point of origin of the ceramics and glass are expected to reveal the range of trading connections enjoyed by St. George's, Bermuda and Williamsburg, Virginia. Table 5.1 shows the results of the measurement of the point of origin of the ceramics for the three sites. Table 5.2 shows the results of the glass quantification. Figures 5.1 (ceramic) and 5.2 (glass) show the same information in bar chart form. The attribution of ceramic sherds to the different countries is general because there were no maker's marks. The glass sherds could not be attributed to any country with any certainty so they were not done. The majority of the glass vessels quantified were bottles from identifiable sources. The remaining vessels were fashioned from lead glass and attributed to Great Britain and Ireland. Although the vessel forms represented could have been manufactured in the British Isles, there is a possibility that these vessels originated on the European continent or in North America as the glass formula was in use in these areas by the late eighteenth century (Jones and Sullivan 1985:12). The ceramic situation is similar. It is likely that the creamware, pearlware, white salt-glazed stoneware, and much of the coarse earthen and stonewares are also from Great Britain, but some of the creamware could have come from the Continent. Thus what is presented here is a coarse measurement of the point of origin of the ceramics and glass.

TABLE 5.1

POINT OF ORIGIN: RICHNESS OF THE CERAMICS

By Country

sherd				vessel		
B	T	PR		B	T	PR
185	397	1295	Great Britian	43	77	70
15		78	United States of America	1		1
71	39	317	China	23	14	20
		10	France			1
1	3	20	Germany		1	
272	439	1720	Totals	67	92	92

By Continent

sherd				vessel		
B	T	PR		B	T	PR
71	39	317	Asia	23	14	20
15		78	North America	1		1
186	400	1325	Europe	43	78	71
272	439	1720	Totals	67	92	92

Quantification at the Trade Network Level was not possible as the ceramics could not be attributed to the specific levels

TABLE 5.2

POINT OF ORIGIN: RICHNESS OF THE GLASS

By Country

sherd				vessel		
B	T	PR		B	T	PR
N/A	N/A	N/A	Great Britian	7	20	N/A
N/A	N/A	N/A	Holland		1	N/A
N/A	N/A	N/A	France		6	N/A
N/A	N/A	N/A	Totals	7	27	N/A

By Continent

sherd				vessel		
B	T	PR		B	T	PR
N/A	N/A	N/A	Europe	7	27	N/A
N/A	N/A	N/A	Totals	7	27	N/A

Quantification at the Trade Network Level was not possible as the ceramics could not be attributed to the specific levels

Figure 5.1 - Point of Origin: Richness of Ceramics by Sherd and Vessel

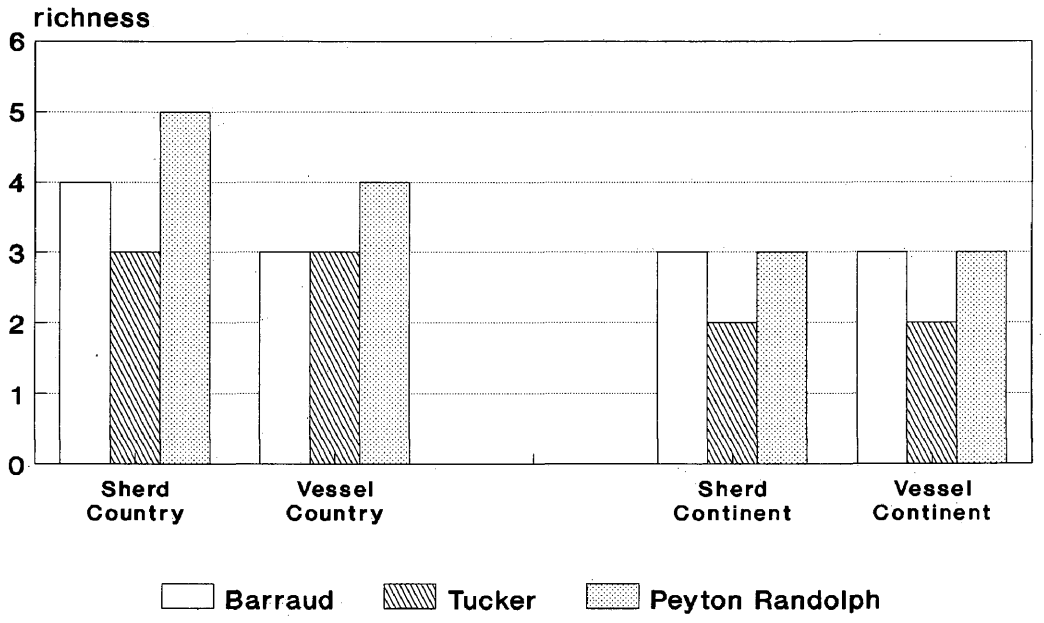
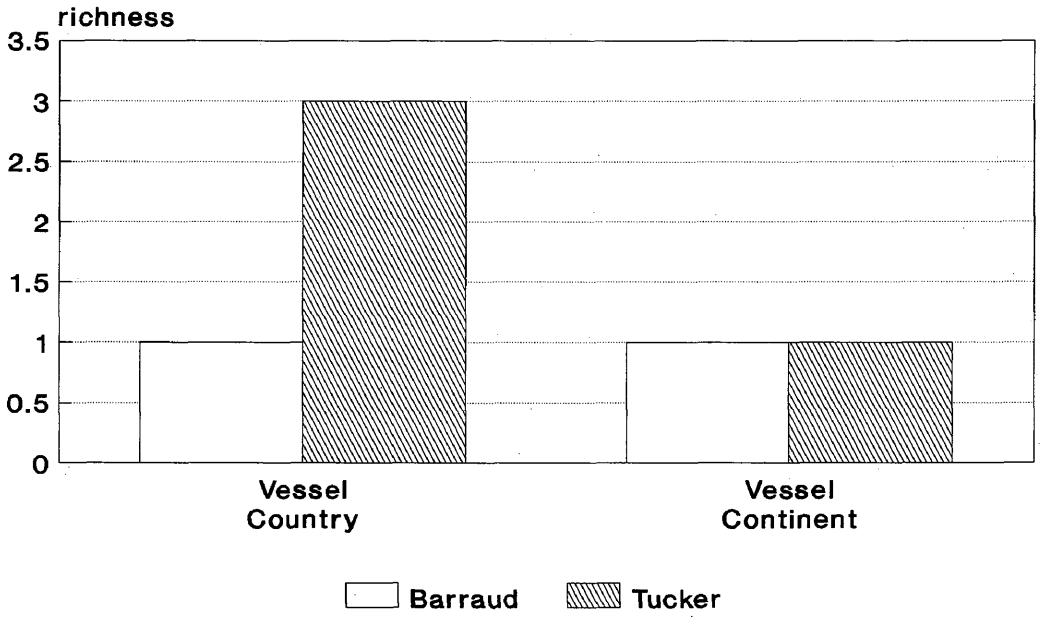


Figure 5.2 - Point of Origin: Richness of Glass by Vessel



Despite the fact that glass and ceramic production occurred throughout the world, it is clear from the results of the quantification that only a few countries were major players in late eighteenth and early nineteenth century international trade. Not surprisingly, the richness values for the point of origin are single digits. In the ceramic quantification by country (Figure 5.1), Peyton Randolph exhibits the highest richness with 5 for sherds and 4 for vessels. Barraud has a richness of 4 for sherds and 3 for vessels and the Tucker deposit ranks a 3 on both counts. As noted above no values could be secured for the glass sherds, but the vessels counts displayed a richness value of 3 for Tucker and 1 for Barraud. No minimum vessel count has been done on the Peyton Randolph material, so it could not be included.

The results of the quantification by country suggest that Williamsburg held a more connected position in the international economy than St. George's. A closer examination of what makes up the richness values may offer a clearer view of the situation.

Part of the Peyton Randolph and Barraud values are made up of ceramics attributed to the United States. Two significant components relate to production and trade networks. These ceramics could represent local production or a larger national production, and they could indicate a number of scales national trade network. The quantification is too

general to address these issues. Until a more specific comparison is carried out, it is difficult to evaluate the importance of the appearance of ceramics produced in the country in question. The inverse situation is found in the Tucker data where no ceramics of Bermudian origin were identified. This is not surprising as Bermuda did not have a ceramic industry. It suggests that Bermuda was more dependent on external suppliers.

The problem that arises with the inclusion of the country in the country-of-origin classification scheme is that it makes the classes unequal. The value is no longer representative of the richness of the goods coming into the country but includes goods moving around within the country. If the countries are dropped from the classification scheme, the values for the Barraud and Peyton Randolph deposits change. Quantified by sherd, Barraud rates a 2, Tucker a 3 and Peyton Randolph a 4. The values tabulated by vessel are 2 for Barraud, 3 for Tucker and 3 for Peyton Randolph. This decreases the difference of the richness values between the deposits, but Williamsburg still maintains more international connections based on the Peyton Randolph sherd value.

Unfortunately, the Peyton Randolph material could not be included in the glass point-of-origin measurements so it is not known what else could be learned. The result for Barraud was a richness value of 1 and a value of 3 for Tucker. These values are small and without a comparison to Peyton Randolph

they are of little use. Yet the Tucker value includes a location not represented in the ceramic material: Holland. This suggests that St. George's and Williamsburg were similar in their richness and, therefore, their access to goods from other countries. The only problem with this interpretation is that it suffers from there being no comparative values from the Peyton Randolph deposit.

The richness quantification by continent does not offer any insight above the quantification by country. The quantification of ceramics by continent resulted in the same values in both sherds and vessels for the three sites (see Table 5.1 and Figure 5.1). Again the Tucker deposit exhibits the lowest value and again it is related to there being no Bermudian ceramic production. The classification is too general to shed light on international trade networks especially since continents do not function as trading units. This particular quantification was done to get a sense of what the general areas of origin were. It has served that purpose, but for addressing specific questions this quantification is not useful.

It was not possible to measure diversity at the trade network level using the levels described by Adams (1976). If it had been possible to quantify ceramics this way with confidence, a trade profile could have been produced for each place. The expectation was that the Williamsburg trade would have a more local orientation than St. George's simply because

Bermuda did not manufacture ceramics and glass. If the ceramic material from Barraud and Peyton Randolph was found to spread across the network levels and Tucker was found to cluster in the higher network levels, a case could be made that Bermuda's access to goods was focused on an international level, more so than Williamsburg. Perhaps such an analysis can be attempted as we learn more about ceramic origins and how ceramics were traded.

Evenness was only calculated for the ceramics as there were not enough data for the glass. The results are presented in Table 5.3 and a bar chart is given in Figure 5.3. An index value of 1.0 indicates evenness and a value of 0.0 indicates extreme skew. Evenness was calculated by sherd and vessel, country and continent.

It is clear from the results that none of the samples are particularly even as none of them are higher than 0.36. It was initially proposed that evenness in a point-of-origin quantification would represent equal trading with the countries (classes) identified. This may well be the case, but in the real world countries have diversified trading relationships with each other. As reflected in the evenness results, ceramics are no exception to this. At all three sites the two major sources of origin were Great Britain and China. In the Williamsburg sites the number three source of ceramics was from the United States followed by other European countries.

TABLE 5.3

POINT OF ORIGIN: EVENNESS OF THE CERAMICS

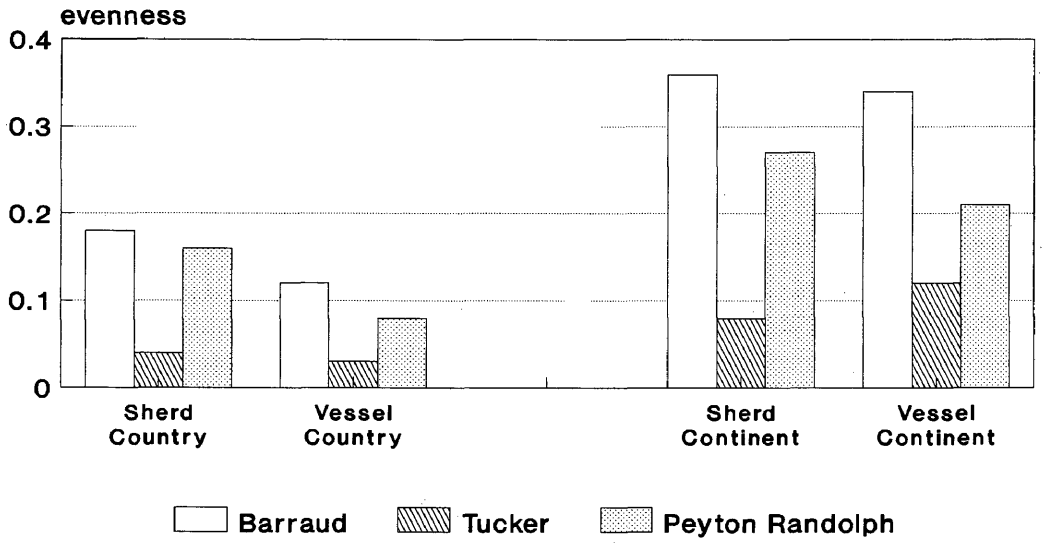
By Country

Sherd		Vessel
0.18	Barraud	0.12
0.04	Tucker	0.03
0.16	Peyton Randolph	0.08

By Continent

Sherd		Vessel
0.36	Barraud	0.34
0.08	Tucker	0.12
0.27	Peyton Randolph	0.21

Figure 5.3 - Point of Origin: Evenness of Ceramics by Country and Continent



1.0 represents evenness
0.0 represents extreme skew

The distribution of sherds and vessels corresponds to our understanding of the ceramic industry and the principal trading powers of the period. Recapping the scene from previous chapters, Great Britain was dominant in the ceramic industry and predominant in North American trade. Both Britain and the United States traded with China and other countries for various wares (e.g. Westerwald stoneware from Germany). Thus the skewed nature of the NM index results for this data is fitting.

The basic evenness pattern between the three sites is the same by country and continent. Barraud is the highest, followed by Peyton Randolph and Tucker (see Figure 5.3). It was found in the interpretation of the richness that the classification by continent was too general to be useful and did not provide any more information than the evaluation by country. The same goes for the evenness results and the discussion here will focus on the results of the country classification.

An examination of the numbers that make up the evenness values reveal that the Tucker low index is a product of the 90% of its sherds which originate from Great Britain. Barraud and Peyton Randolph have only 68% and 75% of their respective assemblages deriving from Britain which accounts for them being less skewed. The evenness measures suggest that St. George's, Bermuda depended on the ceramic goods of Great Britain more than Williamsburg, Virginia did.

The classification scheme particularly useful in addressing the hypothesis was that organized by country and sherd. The vessel and country quantification was useful as a support to the sherd-derived value, but it does little more than condense the information in the sherd value. In addition, some vessel-derived quantification may be affected by sherd size and the researcher's ability to identify unique vessels. Thus the Peyton Randolph vessel count may have suffered as it is a secondary deposit versus the Tucker and Barraud deposits which are primary. The classification scheme by continent was too general to be useful. It also did not correspond to specific trading partners but rather to geographical areas and subsequently had little association with the research questions on trade networks. The classification by Adams's trade network levels was not possible in this study. If it had been, it may have been useful in the derivation of trade profiles. One might also be able to evaluate the significance of ceramic production within a country. The ideal in all of these quantification attempts would be to use materials where a definite point of origin could be pinpointed, for instance via maker's marks. Nevertheless the coarse quantification presented here have served to address the research questions and provide an example of the application of diversity measures in historical archaeology.

When the classification scheme was discussed in Chapter

Four it was suggested that a closer examination of the ceramic ware types and vessel forms coming from the various countries represented might be useful. China was the major producer of porcelain and, as was discussed in Chapter Three, the Tucker deposit was made up mostly of porcelain tea wares while the Barraud and Peyton Randolph assemblages included plates, platters, bowls, pitchers and tureens. The ceramics attributed to Germany were all Westerwald stoneware, and the vessel from Tucker was a chamber pot. The French material from Peyton Randolph was all Faience and the vessel was a storage jar. The material attributed to the United States was American brown stoneware and other American stoneware sherds. The vessel identified for Barraud was a storage jar. Peyton Randolph had sherds of Yorktown type ware, Colono-Indian pottery and blue and grey American stoneware. The only vessel identified was a bowl of Colono-Indian pottery. Over two thirds of the ceramic sherds and vessels identified on all three sites can be attributed to Great Britain. Great Britain was represented by a great variety of fine and utilitarian wares and vessels. All three assemblages included creamware, pearlware, white salt-glazed stoneware, delft ware, and a variety of coarse stonewares and earthenwares. The vessel forms were equally diverse, ranging from plates, bowls, and other table wares to chamber pots, pitchers, pie pans, tankards, bottles, jugs and storage jars.

The way wares and forms were distributed between the

various countries suggests that countries occupied different niches in the ceramic market. China specialized in the higher end of the market, while Germany with its Westerwald Stoneware filled a utilitarian niche with chamberpots, jugs and storage jars. The United States potters produced utilitarian wares of stoneware and coarse earthenware. Great Britain dominated the tableware scene with contributions to the utilitarian market. Bermuda and North America share a general pattern of international ceramic trade dominated by material from Great Britain and China and supplemented with ceramics from other countries. The United States, having its own ceramic industry, deviates somewhat from the pattern.

The results of the measure of diversity are compatible with the above. Low richness values reflect the late eighteenth and early nineteenth century situation where the ceramic trade was dominated by a few countries. The evenness values, leaning towards skew, reflect this by showing an uneven distribution of goods.

The numerical values of the point-of-origin quantification of the ceramics and the glass suggest that Williamsburg had wider reaching connections than St. George's in the international trade network. More countries were represented in the Peyton Randolph assemblage than in the Tucker assemblage. The richness values between the three sites were shown to be similar, not differing by more than two. This suggests that trade connections of Williamsburg and

St. George's were comparable. The fact that the Peyton Randolph assemblage is so much larger than both Barraud and Tucker may also have contributed to the higher richness value for Williamsburg. The interpretation of the evenness calculations revealed that both locales had a pattern of different relationships with their trading partners. It also showed that St. George's relied on Great Britain as a ceramic supplier to a higher degree than Williamsburg. This may partially be because Bermuda had no ceramic industry of her own.

QUALITY: CERAMICS

Measuring the diversity of the quality of ceramic material is expected to show what was available to high-status consumers in St. George's and Williamsburg. Table 5.4 shows the richness values for ceramics quantified for ware/decoration type by sherd and vessel and by vessel form. Figure 5.4 shows the same information in bar chart form. The ware/decoration classification scheme with the distribution of the three ceramic assemblages is in Table 5.5. The vessel-form data is in Table 5.6. A total of 88 different ware/decoration types and 27 vessel forms were identified for the three sites.

The first quantification is the richness of the ware/decoration classification by sherd. Figure 5.4 shows the results with Peyton Randolph exhibiting the greatest richness

TABLE 5.4

QUALITY: RICHNESS OF THE CERAMICS

	Ware Type Sherd	Ware Type Vessel	Vessel Form
Barraud	30	20	13
Tucker	54	33	18
Peyton Randolph	61	21	20

Figure 5.4 - Quality: Richness of Ceramics by Ware Type and Vessel Form

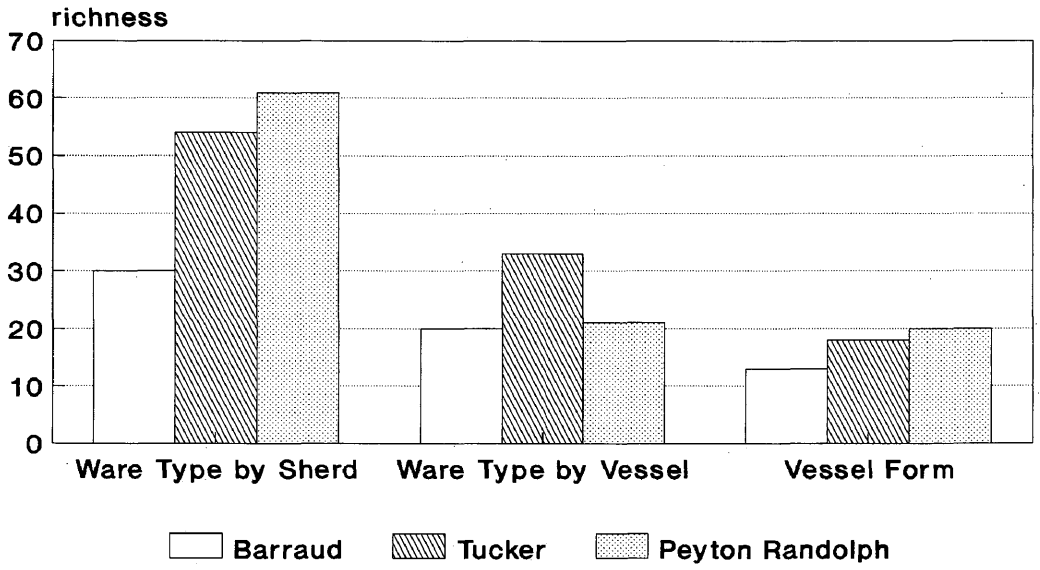


TABLE 5.5

CLASSIFICATION OF CERAMIC WARE/DECORATION TYPE BY SHERD AND VESSEL

	Barraud		Tucker		Pey	Ran
	S	V	S	V	S	V
delftware, undecorated	4		21	1	271	10
delftware, painted blue			28	4	66	4
delftware, painted polychrome			10	1	2	1
delftware, manganese					4	1
rouen faience					2	1
faience					8	
weildon wares					13	2
creamware undecorated	94	15	81	17	491	18
creamware queens shape					3	
creamware royal shape	1	1	5	3	15	2
creamware bead and reel					1	
creamware feather-edge	1	1			38	9
creamware shell-edge					2	
creamware moulded	1	1	2	2	14	1
creamware moulded/painted			2			
creamware painted mono			1		1	
creamware mocha	1					
creamware banded			4			
creamware annular/dipped incised)			9	2		
creamware engine-turned			2		1	
pearlware undecorated	24	2	31		30	6
pearlware shell-edged	8	7	4	3	3	
pearlware painted blue	3		29	7	15	
pearlware painted polychrome			3	1		
pearlware painted other	4	4				
pearlware printed blue	2	1	85	15	2	
pearlware mocha	1					
pearlware banded			3	3	4	
pearlware annular	1					
pearlware annular painted slipcombed					2	
pearlware annular/dipt			1	1		
pearlware sgrafitto					1	
pearlware lustre			2	1		
whiteware undecorated	1		9	1	1	
whiteware painted blue			3			
whiteware painted polychrome			1			
whiteware printed			3			
whiteware flow blue			2			
wsg stoneware undecorated	2	2	8		153	11
wsg stoneware queens shape					1	
wsg stoneware dot-diaper			1	1	9	1
wsg stoneware bead-reel			1	1	5	
wsg stoneware scratch blue	1	1	1			
wsg stoneware scratch blue debased	1	1			5	
wsg stoneware littlers blue					1	
wsg stoneware moulded					2	
wsg stoneware painted over					1	
wsg stoneware dipped					4	1
wsg stoneware engine-turned					6	

	Barraud S	Barraud V	Tucker S	Tucker V	Pey S	Ran V
granite ware/ironstone		1				
chinese porcelain undecorated	7		8		68	8
chinese porcelain painted over	18	6	3	2	63	
chinese porcelain painted over polychrome	1	1	8	4	3	2
chinese porcelain painted over and gilt			1	1		
chinese porcelain painted under	44	16	13	4	165	10
chinese porcelain painted over/under	1		2		12	
chinese porcelain batavian			1		2	
chinese porcelain batavian painted under			2	2		
chinese porcelain batavian painted over			2	1		
chinese porcelain bianco sopra bianco					4	
bone china			2	1	1	
english porcelain undecorated					2	
english porcelain painted under					2	
yellowware moulded	1	1				
astbury type, engine turned			1	1		
black basalt moulded applied	1	1				
english dry bodied - rosso antico engine turned					2	
american brown stoneware	13	1				
blue and grey american stoneware					3	
westerwald stoneware	1		3	1	20	
fulham stoneware	7	1	31	6	90	3
nottingham stoneware			1	1	7	
staffordshire brown stoneware			3		2	
staffordshire brown rouletted			1	1		
staffordshire brown engine turned			1			
drabware stoneware			1			
redware			7	2	38	4
red sandy ware			2		2	
black glazed redware	5	1	3		11	
yorktown type redware			1		59	
slipwares	21	2	8	2	94	5
staffordshire mottled			2		1	
buckley ware					2	
north devon plain			4	1		
north devon gravel					7	
jackfield			3	1	1	
colono indian					16	1
iberian					3	
totals	270	67	463	95	1857	101

TABLE 5.6

CLASSIFICATION OF CERAMIC VESSEL FORM

	Barraud	Tucker	Peyton
tea cup	6	10	11
saucer	4	20	6
tea pot		3	3
lid, sugar		1	
plate	19	22	26
soup plate	3		
bowl	14	14	17
platter	6	2	5
charger			1
tankard/mug	1	4	8
tureen/tureen lid	2	1	
sauce boat			1
custard cup			1
sweetmeat dish		1	1
small dish	1		
basket			1
jug		1	2
pitcher	3	2	3
milk pan		1	
pie pan			1
baker/nappy		3	
storage jar	2	2	2
bottle		3	1
can			2
chamber pot	6	2	7
flower pot			1
ink bottle	1	3	
totals	68	95	100
richness count	13	18	20

and Barraud the lowest. The richness values arrived at correspond to the sample sizes of the three sites suggesting that there is bias involved in the results. In spite of the effects of sample size the richness values for the Tucker and Peyton Randolph sites differ by only 8 points. The ceramic assemblage from the Tucker site is only a quarter of the size of the Peyton Randolph sample. Considering the possible negative influences of sample size, the difference between the values from these two sites is not great. In fact, the sites are quite comparable.

So, if the range of wares available in a community reflect its position in the international trade network, and we consider the richness of Tucker and Peyton Randolph comparable, then it follows that St. George's and Williamsburg had similar access to ceramic goods. An examination of the richness values in combination with the actual ware and decoration types found will reveal more about the nature of the ceramics available.

Table 5.5 lists the ware/decoration types found at each site. For the most part, the range of ware/decoration types are the basic ware types: delftware, creamware and pearlware. These are comparable between the three sites, or at least between Tucker and Peyton Randolph. The major discrepancies between the ware/decoration types of Tucker and Peyton Randolph are in white salt-glazed stoneware, coarse earthenware and whiteware. In addition, there are a few types

that do not occur at all on one site or the other including faience, Wheildon wares, ironstone and yellowware. Some of these differences are due to the nature of the deposits. In Chapter Four the duration of the deposition period of the Peyton Randolph deposit was discussed. It was concluded that it had been laid over a longer period of time, starting earlier than the other two sites. This explains the presence of the earlier wares found at Peyton Randolph such as the Wheildon ware and the quantity of white salt-glazed stoneware. The faience found at Peyton Randolph may be related to the earlier deposition period. The Peyton Randolph deposit may also have been sealed a little before the Tucker and Barraud deposits. This would explain the presence of the ironstone and yellowware at Barraud and the quantity of whiteware from Tucker.

The discrepancy between Peyton Randolph and Tucker in the coarse earthenwares, eleven versus eight respectively, is not entirely explained by the temporal qualities of the deposits. The wares not found at Tucker were Buckley, Colono-Indian and Iberian type wares. The Colono-Indian ware, produced in North America, may be an early ware and because it is a local ware its absence in Bermuda is not surprising. The lack of Buckley ware is curious as it is a product of Great Britain. The dearth of Iberian ware is also odd because so much of Bermuda's food was imported and at some of it would have arrived in Iberian ware storage jars. Certainly the

newspapers of the day advertised goods being sold in jars, including a variety of oils which could have come from the Iberian Peninsula.

The Tucker deposit had two more coarse stonewares than Peyton Randolph. The distinguishing factor was the decoration on two sherds of Staffordshire stoneware. No decorated stonewares of British origin were found in the Peyton Randolph deposit which included American made coarse stonewares not found in Bermuda.

Bone china was found at Tucker and Peyton Randolph. Thirty-nine sherds of Chinese porcelain were found on the Tucker site and eight different decorations were identified. Out of the 317 sherds from Peyton Randolph only six different decorations were found. Only Peyton Randolph had English porcelain sherds.

This review of the different ware/decoration types found on the three sites has shown that the difference in the richness values between the Tucker and Peyton Randolph deposits is partially related to the biases inherent in the samples. The biases are the difference in sample size and the length of the deposition period. When the effects of these biases are considered in the interpretation, it is clear that the difference in the richness values are only minor. The initial results of the richness quantification pointed to a differential access to goods in the two locations. When the influence of the biases was considered in the interpretation

the richness values of the Tucker and Peyton Randolph assemblages point to the two locations as having access to a comparable range of ceramic ware/decoration types. Thus, although St. George's and Williamsburg may occupy different niches in the international trade network, the goods acquired were similar.

The evenness was calculated for the ware/decoration type by sherd. The results are listed in Table 5.7 and shown in bar chart form in Figure 5.5. To be comparable, all the evenness values had to be calculated using the total number of identified classes. For the ware/decoration types 88 different classes were identified. Since many ware types did not occur on all three sites, the results of the evenness calculations depict extreme skew. The skew is so significant that the true values for Barraud and Tucker are negative digits. Peyton Randolph was the only deposit with a value over zero, even so, it was only 0.09.

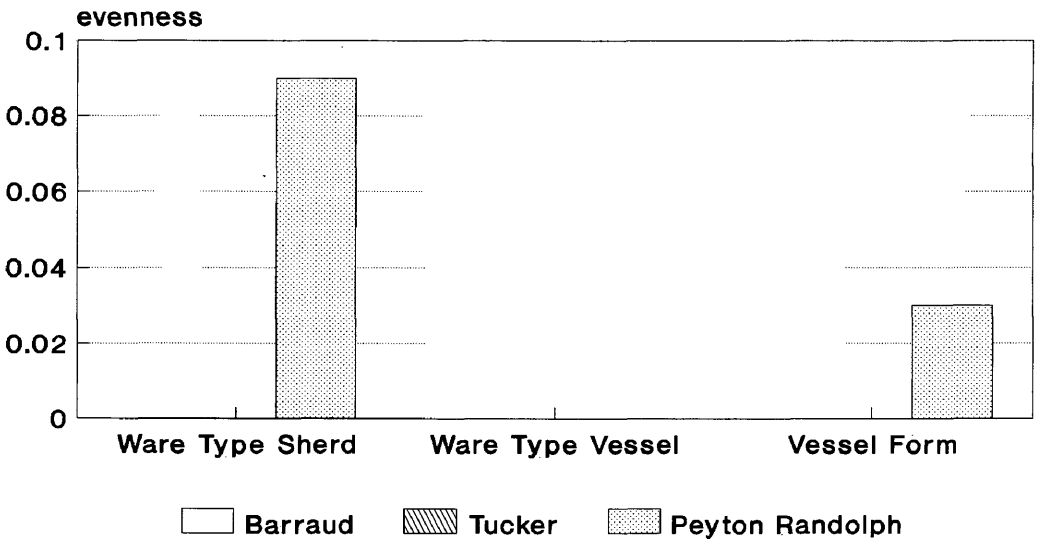
The above results make sense. Consumers in the late eighteenth and early nineteenth centuries did not purchase ceramic in sets, and the wide range of decorative types reflects that. The distribution of the sherd counts show undecorated sherds in quantity and smaller amounts with decoration. This could mean that consumers bought more undecorated wares and supplemented their collection with decorated wares. It may also be related to another characteristic of ceramic material which will influence the

TABLE 5.7

QUALITY: EVENNESS OF THE CERAMICS

	Ware Type Sherd	Ware Type Vessel	Vessel Form
Barraud	0.00	0.00	0.00
Tucker	0.00	0.00	0.00
Peyton Randolph	0.09	0.00	0.03

Figure 5.5 - Quality: Evenness of Ceramics by Ware Type and Vessel Form



1.0 represents evenness
0.0 represents extreme skew

evenness results, namely that decorations often only cover part of the vessel. If an edged-ware plate breaks, most of the sherds could be undecorated. This will inflate the undecorated sherd count creating a greater spread between the number of individuals in the classes and result in a skewed evenness value.

The evenness values for Barraud, Tucker and Peyton Randolph indicate that consumers in St. George's and Williamsburg purchased a wide range of ceramic types. Even though the same wares were not found in both locations, it is clear that a variety of ware/decoration types were available in both places.

Richness and evenness were also calculated for ware/decoration type by vessel. The results of this are in Table 5.5 and Figures 5.4 and 5.5. It was expected that these quantifications would reveal something about the kinds of vessels represented by the ware/decoration types. The richness values show the Tucker deposit highest with a value of 33 followed by Peyton Randolph at 21 and Barraud at 20. Although the minimum vessel counts for the Tucker and Peyton Randolph assemblages were similar, 95 and 101 respectively, the distribution of the Tucker vessels fell over more ware/decoration types. The reason for this is not clear. It may have something to do with the Peyton Randolph deposit having been secondary and/or that fewer diagnostic pieces made up the assemblage. Another contributing factor is that the

vessel count for Peyton Randolph was a conservative calculation. The point is that the distribution of the Peyton Randolph vessels does not reflect the wider range of ware/decoration types identified in the assemblage. This discrepancy suggests that the usefulness of this particular classification scheme is limited.

The richness values show that the identified vessels were distributed over a greater range of wares for Tucker and Barraud (Barraud considering the number of vessels) than for Peyton Randolph. This means that there were more vessels of the same ware/decoration types in the Peyton Randolph assemblage which suggests the occurrence of more matching vessels. This may mean that although there was a variety of ware/decoration types available in Bermuda they were not available in quantity.

Another way to examine the data is to look at the ware types identified in the Tucker sample. The Tucker vessels consisted of pearlwares, Chinese porcelains and the coarse stonewares. The Peyton Randolph vessel assignments, otherwise comparable to Tucker's, were low in these areas. The significance of this is difficult to assess because the distribution of the Peyton Randolph material is not fully understood. Certainly the ware/decoration types are represented indicating the presence of vessels which were not identifiable based on the sherds.

A look at the Barraud and Tucker distributions of ceramic

table wares show that most of the creamware vessels acquired were undecorated while pearlware and Chinese porcelain vessels were decorated. This suggests similar ceramic consumption patterns in St. George's and Williamsburg. The kinds of vessels occurring in the different ware/decoration types between the two locations are similar for all the table wares (pearlware, creamware, white salt-glazed stoneware) except the Chinese porcelain. Here Tucker is almost entirely represented by tea wares while both Barraud and Peyton Randolph include plates, bowls and platters. Barraud even boasts a tureen and Peyton Randolph a can. As was mentioned in Chapter Three, this may be the result of the different trading relationships China had with Great Britain and America. The consumers in each area seem to have valued different vessel forms. The vessel forms in coarse stonewares and earthenwares are similar between the three sites: bowls, bottles, storage jars, pans, pitchers and chamber pots. The only exceptions are the occurrence of a flower pot and a couple of mugs from Peyton Randolph. These similarities and the minor differences indicate a likeness in the profiles of ceramic vessels acquired in St. George's and Williamsburg. This suggests that the kinds of ceramic goods available in the two locations were comparable.

The evenness calculations for the ware/decoration type by vessel suffer from the same problems and result in the same end as those for the ware/decoration type by sherd. The

evenness calculations, based on the 49 different ware/decoration classes identified by vessels, are in Table 5.7 and in Figure 5.5. The values represent extreme skew for all three sites where the actual numbers are negative. As with the ware/decoration by sherd classification scheme these values are influenced by some classes having no individuals representing them.

These evenness values show that consumers in Williamsburg and St. George's did not purchase equal amounts of the various ware/decoration types. This corresponds to the nature of ceramic goods, where the same range of vessel forms was not produced in all ware/decoration types. One would not expect there to be quantities of vessels in westerwald stoneware on a domestic site because a household can only use so many chamber pots, jugs and storage jars. A household would use more table wares, and these were made of white salt-glaze stoneware, creamware, and pearlware. Consequently, there are more sherds and vessels of table ware types of ware/decoration than some other kinds of wares. The evenness values are in keeping with the ceramic material on all three sites.

The above classification scheme has been difficult to interpret. It is a derivative of the ware/decoration type classification scheme. Yet the results of the vessel quantification does not coincide with the richness of the sherd quantification for the sites. This kind of quantification opens itself to biases involved in determining

the minimum vessel count. The Peyton Randolph vessel count does not reflect the diversity of ware/decoration types identified and subsequently is not ideal in the comparison. The vessel richness value of the smaller Barraud sample, which corresponds to its sherd richness, supports the conclusion that the Peyton Randolph vessel sample is not representative of the sample. Had the three deposits been better suited to a comparison of ware/decoration type by vessel more might have been learned about vessels acquired by consumers in St. George's and Williamsburg. The value of this classification scheme comparison has been the opportunity to view the distribution of and kinds of vessels represented by the ware/decoration types. When examined it was clear that the similarities between St. George's and Williamsburg were many and the differences minor. This supports the view that the ceramic goods available in St. George's and Williamsburg were analogous.

The final classification scheme proposed to evaluate the quality of the ceramics is based on the different vessel forms identified from each deposit. The data is presented in Table 5.6 and 5.7 and Figures 5.4 and 5.5. The idea behind this quantification is that the location with greater access to ceramic goods would exhibit a greater richness (range of vessel forms). Evenness was expected to reflect the manner of ceramic form consumption which in turn could be related to what was available.

The richness results correspond to the sherd sample sizes of the three deposits: 13 for Barraud, 18 for Tucker and 20 for Peyton Randolph. The difference of the Peyton Randolph material in this classification versus the ware/decoration type by vessel is curious. The Peyton Randolph and Tucker values are comparable having a difference of only two. In fact, all the values are roughly comparable as about five different vessel forms are represented for every 25 vessels counted. If any deposit suffers it is Peyton Randolph in the coarse stoneware vessel forms where out of more than 100 sherd only 3 vessels were identified (see Table 5.5). In spite of this, there are still six forms of kitchen type wares attributed to the deposit as can be seen in Table 5.6 which is roughly separated into functional categories. It seems that though the Peyton Randolph vessel count distribution is not representative of the range of ware/decoration types, the vessels identified have diversity in form. Based on the vessel form classification richness values for the three sites, it seems that St. George's and Williamsburg have comparable access to ceramic vessel forms.

The comparison of the distribution of vessel forms can be furthered in the examination of Table 5.6 where the vessel forms are roughly sorted into functional groups: tea wares, table wares, kitchen wares and miscellaneous wares. The range of tea ware forms are about the same for Tucker and Peyton Randolph. The table ware forms are wider ranging on the

Barraud and Peyton Randolph sites than for the Tucker deposit. The forms not found at the Tucker site include: charger, custard cup, sauce boat, soup plate and basket. Certainly, the Tucker deposit exhibits the basic forms (plates, bowls, etc.), but it lacks some of these more single purpose forms. The presence of the sweetmeat dish at Tucker indicates that the identified table ware forms were not restricted to the basics. The kitchen-related wares of Tucker and Peyton Randolph are comparable as are the presence of the miscellaneous wares. The table ware group presents the greatest discrepancy between St. George's and Williamsburg and calls for a closer look.

The vessel forms from each deposit are listed in Appendix 2. From those lists it is clear that the majority of the table type ware forms identified are either creamware, pearlware, Chinese porcelain (not much from Tucker) and white salt-glazed stoneware. Some of the forms like bowls and mugs are partially represented by coarse earthenwares. The vessel forms not found at the Tucker site were of creamware (sauce boat and basket), delftware (charger) and white salt-glazed stoneware (custard cup). The presence of these forms suggests that Williamsburg may have had access to a wider range of vessel forms in the standard table wares. The presence of only one of each of the forms makes it difficult to conclude this with confidence, but it is certainly a possibility.

Fortunately there are the Bermuda Gazette advertisements

to refer to. A list of the advertised ceramic vessel forms available in Bermuda was given in Chapter Two. It included pepper and salt mugs, pickle pots, mustard pots, porringers, pudding pans, wash hand bowls, fish drainers, and sauce boats. This, in addition to the range of plate, bowl and cup forms advertised, suggests that the absence of some forms in the archaeological record does not mean they did not occur in Bermuda.

The results of the evenness calculations for the vessel form classification scheme are given in Table 5.7 and Figure 5.5. The values for Barraud and Tucker are skewed and into the negative if actually calculated using the 27 forms identified. Peyton Randolph has a value of 0.03. This again is in line with the nature of ceramic material. Households will utilize vessel forms differentially, sporting more plates and cups than chamber pots and sauce boats. The distribution of the vessels over the ware types supports this showing greater quantities of plates, bowls, cups, mugs/tankards than jugs, pans, platters, tureens, and so on. The evenness calculation for this classification scheme shows that the consumers of St. George's and Williamsburg purchased ceramic forms in uneven quantities.

The quantification of the diversity of the quality of the ceramic material from the Barraud, Tucker and Peyton Randolph deposits has shown that there are a number of similarities between the sites. The ware/decoration type classification by

sherd, with the effects of sample size considered, revealed that St. George's and Williamsburg had access to a similar range of ceramic wares and decorations. The ware/decoration type classification by vessel was not as useful as the sherd quantification. When the diversity measures were considered in combination with the vessels that made up the values, the evidence pointed towards there having been essentially the same kinds of ceramic goods available in both St. George's and Williamsburg. The vessel form classification scheme suggested that Williamsburg may have enjoyed a slightly greater diversity of vessel forms than St. George's. The evenness values for all the classification schemes exhibit skew. These results correspond to the way ceramics were consumed. People purchased different quantities of a variety of ware/decoration types and vessel forms. Consumers in St. George's and Williamsburg seem to have followed this pattern. In summary, the results of the measure of diversity of the quality of the ceramics suggest that the ceramic goods available in St. George's, Bermuda and Williamsburg, Virginia were similar.

QUALITY: GLASS

The diversity of the quality of the glass from the three sites was measured in three ways. The classification schemes were based on ware/decoration type by sherd and vessel and by form/function. The results of the quantification are presented in Tables 5.8 and 5.9 and in Figures 5.6 and 5.7.

TABLE 5.8

QUALITY: RICHNESS OF THE GLASS

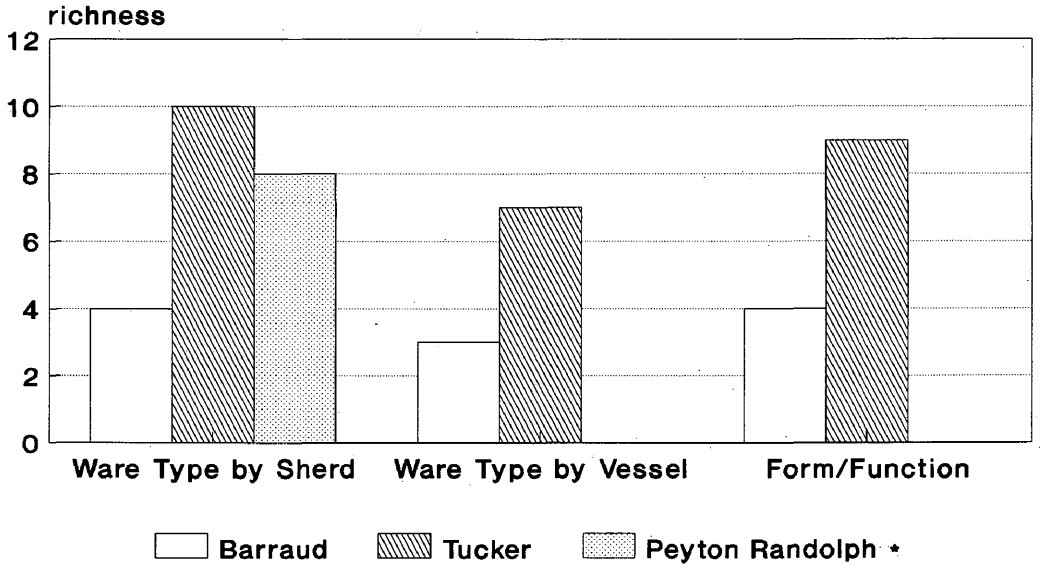
	Ware Type Sherd	Ware Type Vessel	Form/Function Vessel
Barraud	4	3	4
Tucker	10	7	9
Peyton Randolph	8	N/A	N/A

TABLE 5.9

QUALITY: EVENNESS OF THE GLASS

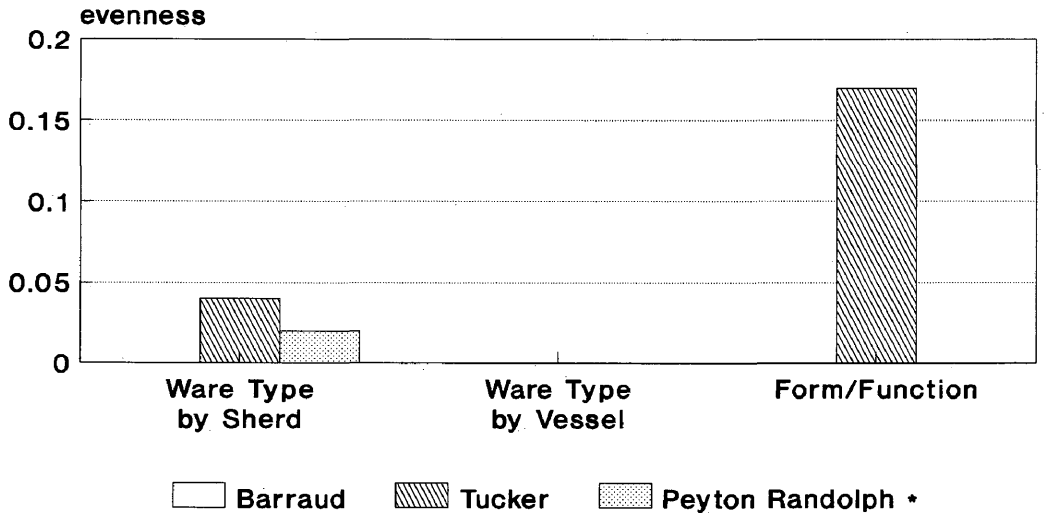
	Ware Type Sherd	Ware Type Vessel	Form/Function Vessel
Barraud	0.00	0.00	0.00
Tucker	0.04	0.00	0.17
Peyton Randolph	0.02	N/A	N/A

Figure 5.6 - Quality: Richness of Glass by Ware Type and Form/Function



* Peyton Randolph in ware by sherd only

Figure 5.7 - Quality: Evenness of Glass by Ware Type and Form/Function



1.0 represents evenness
0.0 represents extreme skew
* Peyton Randolph in ware by sherd only

A total of 14 different ware/decoration types were identified, and there were 10 different vessel forms. It is expected that by measuring the richness of the glass ware/decoration types and vessel forms an understanding of the glass wares available in the two towns will be gained. The evenness is expected to provide a profile of the consumption of glass in each location.

The richness values of the ware/decoration type by sherd for the three deposits are shown in Table 5.8 and Figure 5.6. The Tucker deposit exhibits the highest richness at 10 followed by Peyton Randolph with 8 and Barraud with 4. Again it seems that the Barraud sample suffers from being smaller than the other assemblages. In contrast, the Peyton Randolph deposit does not benefit from being twice the size of the Tucker deposit. The richness value difference between Tucker and Peyton Randolph is only 2, but when the ware/decoration types that contribute to the values are considered, the difference becomes more pronounced.

Table 5.10 shows the breakdown of the ware/decoration types. The differences between the two sites are the coloured glass found only at Peyton Randolph (amber, blue and pink) compared to the range of decorated leaded glass found at Tucker (patter moulding, optic moulding, cut and applied decoration). There was only one piece of decorated glass from Peyton Randolph, a single leaded glass air twist stem. It is difficult to say what items the coloured glass from Peyton

TABLE 5.10

QUALITY OF GLASS BY WARE/DECORATION TYPE

	Barraud		Tucker		Peyton Randolph	
	S	V	S	V	S	V
Green	42	4	884	15	3295	
Aqua	2		55	2	51	
Amber					1	
Blue					1	
Pink					4	
Colourless, non-leaded	4	2	21		89	
Colourless, non-leaded pattern moulding			2			
Colourless, leaded	3	1	141	6	225	
Colourless, leaded air twist					1	
Colourless, leaded pattern moulding			1	1		
Colourless, leaded cut glass			3	1		
Colourless, leaded applied decoration			1	1		
Colourless, leaded moulding			8	1		
Colourless, leaded optic moulding			1			
Totals	51	7	1117	27	3667	

Randolph come from. For example, blue glass was used during the late eighteenth and early nineteenth centuries for table glass (decanters and salt dishes) as well as for medicine bottles (Jones et al.1985:14). The decorated leaded glass sherds from Tucker is most likely from tablewares. Even though the Peyton Randolph material displays a variety of ware/decoration types, it is not as diverse as the Tucker sample, nor does it contain the fancier wares. It appears that there was a higher quality of glass wares available in St. George's than there was in Williamsburg.

The evenness values calculated for this material are given in Table 5.9 and Figure 5.7. They are again skewed with Barraud ranking less than zero, Tucker at 0.04 and Peyton Randolph at 0.02. What is reflected here is the asymmetrical use of glass products. Green wine bottle glass is the largest sherd group in all three samples and reflects their use and abuse in the late eighteenth and early nineteenth centuries. The decorated glass is rarer because there was less of it around and the vessels not as utilitarian which probably meant that they did not get broken as often.

The quantification of the ware/decoration type by vessel, like that done in the ceramic section, is derived from the sherd classification scheme. It is not that useful unless considered in combination with the vessels themselves. No minimum vessel count for glass has been done for the Peyton Randolph deposit, so this comparison and the next one are

limited to the Barraud and Tucker assemblages.

The richness results are given in Table 5.8 and Figure 5.6. As expected from the sherd values the Tucker deposits exhibits the highest value. The Barraud deposit ranks a 3 to Tucker's 7. A comparison of these two assemblages is difficult because of the disparate sample sizes. In both cases most of the ware/decoration types identified for the sherds was associated with at least one vessel. The richness of the Tucker assemblage is made up primarily of vessels attributed to the decorated leaded glass. This quantification does little more than simply support the conclusions of the measurement of the diversity of the sherd based classification scheme.

The evenness values in Table 5.9 and Figure 5.7 for the ware/decoration quantification by vessel depict skew. Again, this is expected for the same reasons skew was found in the sherd calculations. The vessels served different purposes and were accumulated in different quantities in a household.

The final quantification is based on a form/function-oriented classification scheme. The richness values are listed in Table 5.8 and Figure 5.6. Tucker has a value of 9 and Barraud a value of 4. Again there is a problem comparing the two samples because of their sample sizes. The forms listed in Table 5.11 show that the range of Tucker vessel forms supports the earlier conclusion that a range of glass wares were available in St. George's. The occurrence of the

TABLE 5.11

QUALITY OF GLASS BY VESSEL FORM/FUNCTION

	Barraud	Tucker
case bottle	1	
wine bottle, round	3	12
champagne bottle		2
olive oil bottle		1
bottle, pharmaceutical		2
phial		2
tumbler	1	3
stemmed glass	1	2
rummer		1
lamp chimney		2
Totals	6	27

rummer and the champagne bottles suggest that quality goods were present on the island.

Evenness was calculated for the form/function classification scheme and is given in Table 5.9 and Figure 5.7. Barraud ranked a less than 0, and the Tucker value is 0.17. The distribution of forms in Table 5.11 show that bottles make up most of the sample and the high number of round wine bottles contribute to the skew of the Tucker sample. The rest of the vessel distribution is relatively even, which may mean that except for wine bottles the use of glass vessel forms is fairly even throughout a household. It is difficult to say more as these sample sizes are small.

Unfortunately, the measure of diversity of the glass material did not include the Peyton Randolph deposit in all cases. Nevertheless, the quantification of the glass has shown that a range of quality glass ware was available in St. George's and that some of the leaded glass decoration types do not appear in the Williamsburg assemblages. Thus Bermuda had international connections and they provided her with quality glassware.

SUMMARY OF THE MEASURE OF DIVERSITY AND FUTURE APPLICATIONS

In combination, the results of the measure of diversity by point of origin and quality show that the ceramic and glass goods available in St. George's and Williamsburg were at least similar. At first glance the point of origin quantification

suggested that Williamsburg had wider reaching economic connections than St. George's. When these results were closely examined, the trading connections enjoyed by the two areas were found to be comparable.

The quality quantification of the ceramics revealed a number of things, ultimately pointing to the similarity of the ceramics available in Williamsburg and St. George's. When the length of deposition and the larger sample size of the Peyton Randolph assemblage was considered in the classification of ware/decoration by sherd, it was concluded that a comparable range of ceramics was available in Williamsburg and St. George's. The interpretation of the classification of ware/decoration type by vessel supported this conclusion. There was a greater range of vessel forms found in Williamsburg than in St. George's. These vessels were all of ware types made in Great Britain so it may simply have been that since the United States was a bigger market than Bermuda, a greater range of vessel forms were imported.

Although the glass from the Peyton Randolph site could only be partially included in the quality quantification of the glass, the results show that St. George's had access to a wide range of wares. The ware/decoration type by sherd classification scheme, which included Peyton Randolph, showed that St. George's had a range of decorated leaded glass not matched in Williamsburg. The range of glass vessels including a rummer and the champagne bottles support the conclusion that

Bermuda had access to quality glass and other goods (i.e. champagne).

The above conclusions are based on the richness calculation of diversity. The measure of evenness was not as useful in evaluating the goods available in the two locations. All the evenness values represented skew which is accordance with the classification schemes and the way ceramics and glass are consumed. When the evenness values were considered in combination with the actual distribution of the material, they were more useful, if only to show that consumers in St. George's and Williamsburg purchased ware/decoration type and vessel forms in similar proportions.

Of the classification schemes employed the most useful ones were the ware/decoration by sherd and the vessel form oriented schemes. The ware/decoration by vessel classification scheme was a derivative of the same scheme by sherd and did not provide new information. The point of origin schemes would have been more useful had it been possible to attribute the glass and ceramic material to their country of origin with more certainty. The classification scheme by continent was found to be too general and the classification according to Adams' spheres of interaction may have been useful had it been possible.

The measure of diversity of the Barraud, Tucker and Peyton Randolph material has shown that St. George's, Bermuda and Williamsburg, Virginia had similar trading connections and

they had similar glass and ceramic goods. A greater range of ceramic vessel forms were identified in Williamsburg while a greater range of decorated glass ware was available in St. George's.

It was concluded in Chapter Two that Bermuda and Virginia occupied different niches in the international trade network. The hypothesis has been that if sites of the same socioeconomic status from distinct geographic locations occupy different positions in the international trade hierarchy, the positions held will be reflected in the material goods found in the locales. What we have found via the measure of diversity is that either the hypothesis is not true and that material goods do not reflect the positions held in the international trade network, or more specifically that glass and ceramics are not good indicators of position. The results of the diversity measures may also mean that although St. George's and Williamsburg occupied unique niches in the international trade network, their uniqueness did not necessarily put them in different positions in the hierarchical framework. Thus one sees small differences like the vessel forms in the Chinese porcelain, a greater range of ceramic wares in Williamsburg, and greater diversity in glass in St. George's which support the uniqueness of the niche. The overall similarities point to comparable positions in the international trade network.

Although the above application has accomplished its goals

there are two areas that require comment. First of all, it was stated in Chapter Four that in a classification scheme all the classes must be equal. This was true for the classification schemes in the calculation of the richness and evenness values. The problem began when a closer look was taken at the data, specifically the classes represented. This came up initially in the point of origin discussion when the inclusion of the United States in the classification scheme was evaluated. In the discussion of the ware types it comes up again. The classes are not equal as all the ware types are not produced in every vessel form. In addition, the presence of Chinese porcelain on a site means something different than the presence of Buckley ware. This asymmetric significance of different classes does not invalidate the richness and evenness values. The diversity measures were based on the expectation that a higher position in the international trade network would show a greater richness in the point of origin and in the quality of the glass and ceramics of an assemblage. The classification schemes were designed to address these questions, and they do. The point here is that ceramics and glass are not created equal and there are other ways to evaluate them. Had the assemblages in this study been larger, it might have been revealing to quantify the diversity of ware/decoration types in different functional groups e.g. kitchen wares, table wares, tea wares, etc.

The second area that was problematic was the

quantification of evenness. In order to make the values comparable it was necessary to calculate evenness using the total number of identified classes from all three assemblages. For most of the cases this resulted in extreme skew because many of the classes were not represented. This was especially true in the case of ceramics as there are so many kinds of ware/decoration types and forms. Perhaps what is more important is the evenness within a particular sample, the evenness of the identified wares. Had evenness of just the identified wares been calculated in this study the results would have still leaned towards skew as that is the nature of the distribution and the usefulness of the evenness value may not necessarily increase.

The above has been a preliminary application of diversity measures to glass and ceramic material in historical archaeology. Diversity was a useful tool in this case because it required the development of a classification scheme that addressed the research question and because the interpretation of the values could be done with reference to the classification scheme. The value of diversity measures has been in the way it structured the data and the opportunity it provided to interpret material. The single values of richness or evenness were good comparative tools and the ability to incorporate the raw data in the interpretation of the values allowed for a clearer understanding of the significance of the values and the assemblages as a whole. Thus the merit in the

measure of diversity was in its flexibility and in the view of the data it offered.

The potential application of diversity measures goes beyond this application. This study used the simplest possible richness and evenness equations and proved productive. The future of diversity measures lies in our ability to creatively address research questions, design and refine classification schemes, and our ability to secure larger sample sizes. This application has shown that there is a place for diversity measures in historical archaeology.

CHAPTER 6

SUMMARY AND CONCLUSIONS

The objectives of this thesis have been met. The hypothesis has been tested and the usefulness of four kinds of quantification has been evaluated. The alternative application of the three standard forms of archaeological analysis had varying degrees of success. Diversity measures, the fourth method of analysis, proved useful despite its limitations. This final chapter expands on the investigation of the hypothesis and the future of quantitative analysis.

The previous chapters saw the development and testing of the following hypothesis: if sites of the same socioeconomic status and from distinct geographic locations occupy different positions in the international trade hierarchy, the positions held will be reflected in the material goods found in the locales. A review of the economic scenes in Bermuda and Virginia from 1780 to 1810 revealed that although the three sites to be compared from the two locations occupied unique niches in the international economy, they may or may not have been at different levels in the trade hierarchy. There were a number of similarities and differences in the trade connections enjoyed and the glass and ceramic goods available

in St. George's, Bermuda and Williamsburg, Virginia.

Both the Miller and the Zierden and Grimes quantifications showed that the goods available in St. George's were at least comparable to what was available in Williamsburg. A closer examination of the Chinese porcelain vessel forms and decoration types available in both places indicated that they had different access to porcelain, but were not necessarily unequal in a hierarchical sense. St. George's had a greater variety of decorated wares while Williamsburg exhibited a greater range of forms. The Zierden and Grimes status measures also suggest that St. George's had at least a similar access to glass and ceramic goods as Williamsburg. In fact, the results of one measure of table glass points to Bermuda being particularly well supplied with this material.

The interpretation of the diversity measures supported the findings of the other types of quantification. For the most part the numerical values of the richness and evenness indices indicated that Williamsburg had greater trading connections and access to quality ceramic and glass wares. However, upon interpretation of the data, with consideration of the biases involved (sample size, duration of deposition period, etc.), it was clear that the sites from St. George's and Williamsburg enjoyed similar trading connections and access to goods. The point of origin quantifications showed that although Williamsburg had measurable trade connections to

more countries than St. George's, there were similarities. The evenness calculations reflected the fact that both countries had unequal trading relationships with their trading partners. Evenness also suggested that Bermuda relied more on Great Britain as a ceramic supplier than Williamsburg did.

The quantification of quality showed that essentially the same kinds of glass and ceramic wares were available to consumers in St. George's and Williamsburg. The richness values indicated a similar range of decoration/ware types, but Williamsburg showed a slightly wider array of vessel forms. The measure of the quality of the glass suggested that St. George's had access to a wider range of decorated leaded glass than Williamsburg. The evenness indices corresponded to the way people purchase ceramics and glass, buying uneven quantities of decoration, ware type and vessel form. Again, the results show a number of similarities between the goods available and the trade connections of the two locations. The few differences are not great enough to represent totally different positions in the international trade hierarchy. Rather, they confirm that St. George's, Bermuda and Williamsburg, Virginia exploited different niches in the international trade scene, but they did not necessarily function at different levels.

The results of the four types of quantification suggest two conclusions regarding the hypothesis:

1) The hypothesis is true. St. George's and

Williamsburg occupied similar positions in the international economic hierarchy and the glass and ceramics reflect this.

2) The hypothesis is false. St. George's and Williamsburg occupied different positions in the international economic hierarchy and glass and ceramics do not accurately reflect this.

It is doubtful that the second interpretation is accurate. Material culture at the household level is representative of what is available to the consumer. The problem may be that archaeologically the material culture picture is not complete. An example of this is the vessel forms identified at the Tucker House site compared to the range that were advertised in the Bermuda Gazette. There were more vessel forms available on the island than showed up archaeologically. Keeping in mind the factors that hinder the ability of material culture to get from the house into the ground, a great percentage of what was in use gets deposited. The point is, if it was not available there is no chance of it getting into the ground. So, although limited by breakage patterns, disposal patterns, excavation techniques, etc., archaeological assemblages, including glass and ceramics, are good indicators of the goods available in a community.

For the second interpretation of the hypothesis to be correct it must also be assumed that St. George's and Williamsburg occupied different positions in the international

trade network hierarchy. In Chapter Two two views on Bermuda's economic situation were presented, Greene's (1988) and Meinig's (1986). Greene took a pessimistic perspective, choosing to focus on the lack of production and export potential of Bermuda. Meinig, on the other hand, looked at the same factors and saw the need of Bermudians to develop and capitalize on commercial connections off the island. The review of the newspaper advertisements for the ceramics and glass wares on the island indicated a wide range of goods available to its inhabitants. Although it was not possible to discover as completely what was glass and ceramic was available to Williamsburg consumers, the York County records give a glimpse of the range of goods and it was relatively comparable.

The quantifications of the assemblages from the Tucker House, Barraud, and Peyton Randolph sites correspond to the hypothesis and show that St. George's and Williamsburg occupied similar positions in the international trade hierarchy. The variation in the material goods found in both locales suggests that St. George's and Williamsburg exploited distinctive economic niches on a comparable level within the hierarchy.

The testing of this hypothesis has been preliminary. Further testing would be necessary to confirm the conclusions drawn in my thesis. The use of larger samples and a greater number of them for comparison is recommended.

Just as the testing of the hypothesis was preliminary so was the alternative applications of the three standard tools of archaeological analysis; South's pattern recognition, Miller's status indexing, and Zierden and Grimes's status measures. The modified use of the two status quantifications proved more useful than South's method which was too general to fully address the hypothesis. Status measures lend themselves to alternative applications of this kind because they can be refocused to address questions regarding the availability of goods when status can be held constant.

Diversity measures were not as effective as hoped in my application. I encountered many of the problems the measure is know for including sample size, equality in the classification scheme, and biases inherent in the richness and evenness calculations used. To avoid these obstacles in the future I would recommend using large, similarly sized samples and using some of the more complex richness and evenness formulae. The problems with classification schemes may be unavoidable. They reveal themselves when interpretations of the data behind the number value are made. When a researcher does this undoubtedly different aspects of the data will be stressed. This may be a weakness of any kind of quantification of archaeological material.

I also encountered problems with the comparability of the assemblages. Different screen sizes were used in the retrieval of the material and the three deposits represented

unique duration periods. These kinds of obstacles are virtually unavoidable in a discipline where the data is a result of human behaviour. Variables must be considered on a number of levels: those inherent in the culture under study such as status, religion and ethnicity; those affecting cultural deposits in the ground such as slumping, rodents and preservation; those influencing the excavation of the deposits such as screen size and research design; and those swaying the analysis process such as sample size. Compounding these variables are those intrinsic to our own culture. Often research is criticized because variables have not been considered.

Thomas McGovern (1992) addressed the issue of variables. He confirmed that the ideal in archaeological research has been to compare like components. In spite of this, archaeologists are often forced to compare apples and oranges, but McGovern argued that this may be a positive thing. He claimed that through the comparison of less than ideal components researchers are apt to learn more because of the increased challenge. McGovern suggested that to reduce the influence of variables researchers refrain from focusing on any one element or artifact group in isolation. Multiple sets of data pointing to the same conclusions strengthen the basis for the comparison. Data types proposed by McGovern include, historical records, architectural data such as room sizes, artifacts, and faunal material.

Diversity measures are suitable for the kind of research advised by McGovern because they have a flexible application process. It allows for the interpretation of data manipulated in a variety of ways, and because conclusions can be drawn from the values with reference to the classification scheme much can be deduced from the data.

The future of quantitative analysis in historical archaeology must be bright. Archaeological material lends itself to being counted and mathematical manipulation of data can be accomplished and interpreted in a multiplicity of ways. The requirements for the constructive employment of quantitative tools are methods of analysis that address the research questions, careful consideration of biases, comprehensive interpretation of results, and a little imagination.

APPENDIX 1

DIVERSITY DATA FOR POINT OF ORIGIN AND GLASS CALCULATIONS

POINT OF ORIGIN - CERAMICS SITE: Barraud

BY COUNTRY:

vessel	sherd	
43	185	Great Britain
1	15	United States of America
23	71	China
		Holland
		France
	1	Germany
67	272	TOTALS

BY CONTINENT:

vessel	sherd	
23	71	Asia
1	15	North America
43	186	Europe
67	272	TOTALS

BY TRADE NETWORK LEVEL:

vessel	sherd	
		local
		local-commercial
		area-commercial
		regional
		national
		international

POINT OF ORIGIN - CERAMICS SITE: Tucker

BY COUNTRY:

vessel	sherd	
77	397	Great Britain
		United States of America
14	39	China
		Holland
		France
1	3	Germany
92	439	TOTALS

BY CONTINENT:

vessel	sherd	
14	39	Asia
		North America
78	400	Europe
92	439	TOTALS

BY TRADE NETWORK LEVEL:

vessel	sherd	
		local
		local-commercial
		area-commercial
		regional
		national
		international

POINT OF ORIGIN - CERAMICS

SITE: Peyton Randolph

BY COUNTRY:

vessel	sherd	
70	1295	Great Britain
1	78	United States of America
20	317	China
		Holland
1	10	France
	20	Germany
92	1720	TOTALS

BY CONTINENT:

vessel	sherd	
20	317	Asia
1	78	North America
71	1325	Europe
92	1720	TOTALS

BY TRADE NETWORK LEVEL:

vessel	sherd	
		local
		local-commercial
		area-commercial
		regional
		national
		international

POINT OF ORIGIN - GLASS SITE: Barraud

BY COUNTRY:

vessel	sherd	
7		Great Britain
		United States of America
		China
		Holland
		France
		Germany
7		TOTALS

BY CONTINENT:

vessel	sherd	
		Asia
		North America
		Europe

BY TRADE NETWORK LEVEL:

vessel	sherd	
		local
		local-commercial
		area-commercial
		regional
		national
		international

POINT OF ORIGIN - GLASS SITE: Tucker

BY COUNTRY:

vessel	sherd	
20		Great Britain
		United States of America
		China
1		Holland
6		France
		Germany
27		TOTALS

BY CONTINENT:

vessel	sherd	
		Asia
		North America
27		Europe
27		TOTALS

BY TRADE NETWORK LEVEL:

vessel	sherd	
		local
		local-commercial
		area-commercial
		regional
		national
		international

APPENDIX 2

VESSEL FORM LIST

	B	T	PR
Chinese Porcelain:			
plate, underglaze blue	7	1	8
plate, painted polychrome			2
soup plate, underglaze blue	3		
platter, underglaze blue	2		1
shallow bowl, underglaze blue	2		
large bowl, painted over	1		
bowl, painted under			1
cup w/ handle, painted over polychrome		1	
cup w/o handle, underglaze blue	1		2
cup w/o handle, plain			2
cup w/o handle, painted over	3	1	
cup w/o handle, painted over polychrome		1	
cup w/o handle, batavian underglaze blue		1	
cup w/o handle, batavian painted over		1	
saucer, painted over	1	2	
saucer painted over polychrome	1	1	
saucer painted over red and gilt		1	
saucer, painted under		3	1
saucer, batavian underglaze blue		1	
small tureen, underglaze blue	1		
oval tureen lid, painted over	1		
pitcher, painted under			1
lidded vessel			1
can, painted under			1
English porcelain:			
cup w/ handle		1	
Creamware:			
plate, feather-edge	1		6
plate, plain	4	3	
plate, bath shape		1	
plate, Royal pattern		3	2
plate, scalloped edge		1	
platter, feather edge			3
platter, Royal pattern	1		
platter, plain	1		1
saucer		2	3
large saucer			1
tea bowl			5
small dish, moulded	1		
bowl	4	5	2
small bowl			1
chamber pot	6		1
basket			1
sauce boat			1
tea pot lid			1
tea pot		1	

	B	T	PR
baker/nappy		2	
sweetmeat dish, moulded		1	
mug/tankard incised & filled/annular		1	
mug/tankard		3	1
milk jug			1
lid		1	
Whiteware:			
bowl		1	
Jackfield:			
lid, sugar bowl		1	
Delft:			
plate, painted		2	2
plate, plain		1	2
saucer, painted		1	
bowl, painted polychrome		1	1
bowl, manganese and white			1
bowl, plain			3
punch bowl, painted			2
cup w/o handle, painted		1	
chamber pot, plain			4
can			1
White salt-glazed stoneware:			
plate, dot-diaper-basketweave		1	
plate, bead and reel		1	1
plate, basketweave			1
platter, plain	1		
bowl, plain	1		3
bowl, scratch blue	1		
bowl, scratch blue debased	1		
tea bowl			1
tankard			1
tea pot			2
chamber pot			1
sweatmeat dish			1
custard cup			1
pitcher			1
Black basalt:			
pitcher, moulded	1		
Slipware:			
pitcher, refined red bodied	1		
bowl, red bodied	1		
bowl		2	

	B	T	PR
charger			1
mug, bulbous			1
mug, dotware			1
pie pan			1
tankard			1
Westerwald:			
chamber pot		1	
Astbury:			
tea pot, engine turned		1	
Redware:			
milk pan		1	
chamber pot		1	1
bowl			1
pitcher			1
flower pot			1
Pearlware:			
plate, shell-edged	7	2	1
plate, painted under		1	
plate, printed under		5	
platter, shell-edged	1	1	
platter, printed under		1	
baker/nappy, printed under		1	
tea pot, painted under		1	
bowl, plain	2		
bowl, painted under		3	
bowl, printed under	1	2	
cup w/ handle, painted under		1	
cup w/ handle, annular/dipped		1	
cup w/ handle, printed under		1	
tea bowl, painted under			1
tea cup, painted over polychrome	1		
tea cup, painted blue	1		
saucer, painted under		6	1
saucer, printed under		3	
saucer, painted brown	1		
saucer, painted polychrome	1		
tureen, printed under		1	
pitcher, lustre		1	
tankard, plain			2
tankard, painted blue			1
Yellowware:			
pitcher, moulded	1		

	B	T	PR
Fulham stoneware:			
bottle, ink	1		
bottle			1
jug			1
storage jar			1
Colono-ware:			
bowl			1
Wheildon:			
small bowl			1
plate			1
Rouen faience:			
storage jar			1
American brown stoneware:			
storage jar	1		
Black glazed redware:			
tankard	1		
North devon:			
storage jar		1	
Staffordshire brown stoneware:			
pitcher, rouletted		1	
Nottingham Stoneware:			
jug		1	
English brown stoneware:			
bottle, ink/mucilage		1	

REFERENCES CITED

Ackermann, Eric G.
1991 Economic Means Index: A Measure of Social Status in the Chesapeake, 1690-1815. *Historical Archaeology* 25(1):26-36.

Adams, William H.
1976 Trade Networks and Interaction Spheres - A View from Silcott. *Historical Archaeology* 10:99-112.

Agnew, Aileen Button
1988 Ceramics and the Sea Trade in Portsmouth, New Hampshire: 1765-1785. *Northeast Historical Archaeology* 17:40-59.

Armstrong, Richard
1969 *The Merchantmen*. Ernest Benn Ltd., London.

Baugher-Perlin, Sherene
1982 Analyzing Glass Bottles for Chronology, Function and Trade Networks. In *Archaeology of Urban Armerica: The Search for Pattern and Process*, ed. by Roy S. Dickins, Jr., 259-290. Academic Press, New York.

Beaudry, Mary C.
1978 Ceramics in York County, Virginia Inventories, 1730-1750: The Tea Service. *Conference on Historic Site Archaeology Papers, 1977* 12:201-210.

Benson, Donna Lynne
1978 A Reconsideration of the 'Carolina Pattern'. *Conference on Historic Site Archaeology Papers, 1977* 12:32-67.

Bermuda Gazette [St. George's]
(*BG*)
1784-1809 *Bermuda Gazette* 2, 21, 30, 49, 162, 165, 188, 193, 263, 284, 341, 365, 370, 381, 517, 527, 572, 586, 640, 662, 680, 697, 704, 705, 708, 715, 731, 733, 759, 849, 946, 951, 1118, 1224, 1240, 1300, 1314.

Bobrowsky, Peter T.
1985 The Measurement of "Diversity" and its *Relation to Status Recognition in Historical Archaeological Sites. In Status, Structure and Stratification: Current Archaeological Reconstructions, Proceedings of the Sixteenth Annual Chacmool Conference*:393-397. Marc Thompson, Maria Teresa Garcia and Francois J. Kense, editiors. The Archaeological Association of the University of Calgary, Calgary.

Bobrowsky, Peter and Bruce F. Ball
1989 The Theory and Mechanics of Ecologicl Diversity in Archaeology. In *Quantifying Diversity in Archaeology*, edited by Robert D. Leonard and George T. Jones, pp. 4-12. Cambridge University Press, Cambridge.

Bowen, Joanne
1978 Probate Inventories: An Evaluation from the Perspective of Zooarchaeology and Agricultural History at Mott Farm, In *Historical Archaeology: A Guide to Substantive and Theoretical Contributions*, edited by Robert L. Schuyler, pp. 149-159. Baywood Publishing Company, Inc., Farmingdale.

Brown, Marley R. III, Andrew C. Edwards, William E. Pittman, Joanne Bowen and Patricia M. Samford
1991 Preliminary report of the Excavation of the President Henry Tucker House, St. George's, Bermuda. Department of Archaeological Research, Colonial Williamsburg Foundation, Williamsburg.

Cleghorn, Paul L.
1981 The Community Store: A Dispersal Center for Material Goods in Rural America. *Modern Material Culture: The Archaeology of Us*, ed. by Richard A. Gould and M.B. Schiffer, 197-212. Academic Press, New York.

Colonial Williamsburg Archives (CWA)
1780 An Appraisement of the Estate of Richard Charlton. *York County Wills & Inventories 22, 1771-1783*. 469-470. Colonial Williamsburg Foundation, Williamsburg.

1783-[1811] Inventory of sundry Goods Wares and Merchangize at Ltg. *York County Wills & Inventories 23, 1783-1811*. 410-416. Colonial Williamsburg Foundation, Williamsburg.

1789a An Inventory and appraisement of the Estate of Frances Charleton. *York County Wills & Inventories 23, 1783-1811*. 506-509. Colonial Williamsburg Foundation, Williamsburg.

1798b Inventory of Goods remaing at the Store Kept at Glostor. *York County Wills & Inventories 23, 1783-1811*. 510-512. Colonial Williamsburg Foundation, Williamsburg.

1805 Appraisement of Property belonging to the estate of John Moss. *York County Wills & Inventories 23, 1783-1811*. 666-669. Colonial Williamsburg Foundation, Williamsburg.

Condliffe, J.B.
1950 *The Commerce of Nations*. W.W. Norton & Company, Inc., New York.

Conkey, Margaret W.
1980 The Identification of Prehistoric Hunter-Gatherer Aggregation Sites: The Case of Altamira. *Current Anthropology* 21(5):609-30.

Dabney, Virginius
1971 *Virginia: The New Dominion*. Reprint of 1927 edition. Doubleday & Company, Inc., Garden City.

Deagan, Kathleen
1987 *Artifacts of the Spanish Colonies of Florida and the Caribbean, 1500-1800, Volume 1: Ceramics, Glassware and Beads*. Smithsonian Institution Press, Washington.

Deetz, James
1991 Introduction: Archaeological Evidence of Sixteenth- and Seventeenth-Century Encounters. In *Historical Archaeology in Global Perspective*, ed. by Lisa Falk, 1-9. Smithsonian Institution Press, Washington.

1977 *In Small Things Forgotten: The Archaeology of Early American Life*. Doubleday, New York.

Deetz, James and Edwin S. Dethlefson
1967 Death's Head, Cherub, Urn and Willow. *Natural History* 76(3):29-37.

Dickens, R.S.
1980 Ceramic Diversity as an Indicator of Cultural Dynamics in the Woodland Period. *Tennessee Anthropologist* 5:34-46.

Fager, E.W.
1972 Diversity: A Sampling Study. *American Naturalist* 106(949):293-310.

Falk, Lisa (editor)
1991 *Historical Archaeology in Global Perspective*. Smithsonian Institution Press, Washington.

Fayle, C. Ernest
1933 *A Short History of the World's Shipping Industry*. George Allen & Unwin Ltd., London.

Fischell, Rosalind
1987 *Blue & White China: Origins/Western Influences*, edited by John Esten. Little, Brown and Company: Boston.

Garaventa, Donna M. and Allen G. Pastron
1983 Chinese Ceramics from a San Francisco Dump Site. In *Forgotten Places and Things: Archaeological Perspectives on American History*, ed. by Albert E. Ward, 295-320. Vol. 3 of Contributions to Anthropological Studies, Center for Anthropological Studies, Albuquerque, New York.

Grayson, D. K.
1984 *Quantitative Zooarchaeology: Topics in the Analysis of Archaeological Faunas*. Academic Press, Orlando.

Greene, Jack P.
1988 *Pursuits of Happiness: The Social Development of Early Modern British Colonies and the Formation of American Culture*. The University of North Carolina Press, Chapel Hill.

Henretta, James A. and Gregory H. Nobles
1987 *Evolution and Revolution, American Society, 1699-1820*. D.C. Heath and Company, Lexington.

Jones, George T. and Robert D. Leonard
1989 The Concept of Diversity: An Introduction. In *Quantifying Diversity in Archaeology*, edited by George T. Jones and Robert D. Leonard, pp. 1-3. Cambridge University Press, Cambridge.

Jones, Newton B.
1964 Weights, Measures, and Mercantilism: The Inspection of Exports in Virginia, 1942-1820, In *The Old Dominion: Essays for Thomas Perkins Abernethy*, edited by Darrett B. Rutman, pp.122-134. The University Press of Virginia, Charlottesville.

Jones, Olive and Catherine Sullivan with contributions by George Miller, E.Ann Smith, Jane E. Harris and Kevin Lunm
1985 *The Parks Canada Glass Glossary*. Environment Canada - Parks, Ottawa. Studies in Archaeology, Architecture and History.

Jones, Timothy William
1983 Population and Trade: An Economic Mathematical Model. *Conference on Historic Site Archaeology Papers, 1980* 15:1-49.

Joseph, J.W. and Stephen C. Bryne
1992 Socio-economics and Trade in Viejo San Juan, Puerto Rico: Observations from the Ballaja Archaeological Project. *Historical Archaeology* 26(1):45-58.

Kintigh, Keith
1989 Sample Size, Significance, and Measures of Diversity. In *Quantifying Diversity in Archaeology*, edited by R.D. Leonard and G.T. Jones, 25-36. Cambridge University Press, Cambridge.

Klein, Joel I.
1973 Models and Hypothesis Testing in Historical Archaeology. *Historical Archaeology*, 7:68-77.

Leonard, Robert D. and George T. Jones (editors)
1989 *Quantifying Diversity in Archaeology*. Cambridge University Press, Cambridge.

Marshall, Michael
1990 *Ocean Traders: From the Portugese Discoveries to the Present Day*. Facts On File, New York.

McGovern, Thomas
1992 Workshop Given at The North Atlantic Biological Organization Meeting, New York, New York.

Meinig, Donald W.
1986 *The Shaping of America: A Georgraphical Perspective on 500 Years of History. Volume 1 Atlantic America, 1492 - 1800*. Yale University Press, New Haven.

Microys, Karen
1991 The Meaning of Diversity in the Material Life of English Colonial Elites: Households from St. George's, Bermuda and Williamsburg, Virginia, Compared. Paper presented at the Society for Historical Archaeology Congerence on Historical and Underwater Archaeology, Richmond, Virginia.

Miller, Henry M.
1979 Pettus and Utopia: A Comparison of the Faunal Remains from Two Late Seventeenth Century Virginia Households. *Conference on Historic Site Archaeology Papers, 1978* 13:158-179.

Miller, George L.
1991 A Revised Set of CC Index Values for Classification and Economic Scaling of English Ceramics from 1787 to 1880. *Historical Archaeology* 25(1):1-25.

1980 Classification and Economic Scaling of 19th Century Ceramics. *Historical Archaeology* 14:1-40.

Miller, George L., Ann Smart Martin and Nancy S. Dickinson
1989 Changing Consumption Patterns, English Ceramics and the American Market from 1770 to 1840. fourth draft to be published as part of the 29th Winterthur Conference.

Minchinton, Walter E. and David J. Starkey
1987 Characteristics of Privateers Operating from the British Isles Against America, 177-1783. In *Ships, Seafaring and Society*, edited by Timoty J. Runyan, pp.251-274. Wayne State University Press, Detroit.

Noël Hume, Ivor
1973 Creamware to Pearlware: A Williamsburg Perspective. In *Ceramics in America*, edited by Ian M. G. Quimby, pp. 217-254. The University Press of Virginia, Charlottesville.

Onions, C.T. (editor)
1973 *The Shorter Oxford English Dictionary*. Clarendon Press, Oxford.

Rice, P.M.
1981 Evolution of Specialized Pottery Production: A Trial Model. *Current Anthropology* 22(3)219-240.

Riordan, Timothy B. and William H. Adams
1985 Commodity Flows and National Market Access. *Historical Archaeology* 19:5-18.

Rothschild, Nan A.
1989 The Effect of Urbanization on Faunal Diversity: A Comparison Between New York City and St. Augustine, Florida, in the Sixteenth to Eighteenth Centuries. In *Quantifying Diversity in Archaeology*, edited by Robert D. Leonard and George T. Jones, pp. 92-99. Cambridge University Press, Cambridge.

Schaffer, Alan
1964 Virginia's "Critical Period". In *The Old Dominion: Essays for Thomas Perkins Abernethy*, edited by Darrett B. Rutman, pp.152-170. The University Press of Virginia, Charlottesville.

Singer, David A.
1987 Threshold of Affordability: Assessing Fish Remains for Socioeconomics, In *Consumer Choice in Historical Archaeology*, edited by Suzanne Spencer-Wood, pp. 85-99. Plenum Press, New York.

Skowronek, Russell K.
1992 Empire and Ceramics: The Changing Role of Illicit Trade in Spanish America. *Historical Archaeology* 26(1):109-118.

Smart, Ann Morgan
1986 The Urban/Rural Dichotomy of Status Consumption: Tidewater Virginia, 1815. M.A. Thesis, The College of William and Mary, Williamsburg.

South, Stanley
1988 Whither Pattern? *Historical Archaeology* 22(1):25-28.

1977 *Method and Theory in Historical Archaeology*. Academic Press, New York.

Stevenson, Marc G.
1983 Pattern in Pattern Recognition? *Conference on Historic Site Archaeology Papers, 1980* 15:57-70.

Virginia Gazette [Williamsburg]
(*VG*)
1780 *Virginia Gazette* 52:4

1782 *Virginia Gazette* 6:3-4

1783 *Virginia Gazette* 59:3

1784 *Virginia Gazette* 137:4

Warfel, Stephen G.
1982 A Critical Analysis and Test of Stanley South's Artifact Patterns. *Conference on Historic Site Archaeology Papers, 1979* 14:137-190.

1983 A Critical Analysis and Test of Stanely South's Artifact Patterns. In *Forgotten Places and Things: Archaeological Perspectives on American History*, ed. by Albert E. Ward, 267-273. Vol. 3 of Contributions to Anthropological Studies, Center for Anthropological Studies, Albuquerque, New York.

Wertenbaker, Thomas J.
1962 *Norfolk: Historic Southern Port*, edited by Marvin W. Schlegel. Second edition. Duke University Press, Durham.

Whitney, Jeanne Ellen
1983 Clues to a Community: Transactions at the Anderson-Low Store 1784-1785. Unpublished M.A. thesis, Department of History, The College of William and Mary, Williamsburg.

Wilkinson, Henry C.
1973 *Bermuda From Sail to Steam: A History of the Island from 1784 to 1901*. Oxford University Press, London.

1950 *Bermuda in the Old Empire: A History of the Island from the Dissolution of the Somers Island Company until the End of the American Revolutionary War: 1684-1784*. Oxford University Press, London.

Williams, Jack S.
1992 The Archaeology of Underdevelopment and the Military Frontier of Northern New Spain. *Historical Archaeology* 26(1):7-21.

Wise, Carol
1976 Date and Status in 18th Century Delaware: An Archaeologist's View. *Transactions of the Delaware Academy of Science 1974 and 1975*.

Wright, J. Leitch, Jr.
1971 *Anglo-Spanish Rivalry in North America*. University of Georgia Press, Athens.

Zierden, Martha and Kimberly Grimes with contributions by Suzanne Buckley, Ziyadah Kirnon, Elizabath Reitz, Michael Trinkley and Karl Reinhard

1989 *Investigating Elite Lifeways Through Archaeology: The John Rutledge House*. The Charleston Museum Archaeological Contributions No. 21. The Charleston Museum, Charleston, South Carolina.

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